RAILROAD GAZETTE

FRIDAY, FEBRUARY 1, 1901.

CONTENTS

ILLUSTRATED:
The New Class I Central-Atlantic Type Locomotives —New York Central ... 72
Locomotive Classification on the Pennsylvania ... 74
The "Handy" Car ... 75
Sterlingworth Rolled Steel Cars ... 78
Pneumatic Yoke Riveter—Philadelphia Pneumatic Tool Co. ... 83

EDITORIAL:
Facilities for "Finding" Stop Signals ... 80
Locomotive Rating ... 80
December Accidents ... 81
Railroad and Commercial Telegraphy ... 81
Editorial Notes ... 80, 81, 82
New Publications ... 82
Trade Catalogues ... 82

CONTRIBUTIONS:
Freight Yards Again ... 71
Classifying Locomotives ... 71
Combinations and Our Present Duty ... 71

MISCELLANEOUS:
Grand Central Station ... 75
Compressed Air in New York ... 76
Ballast ... 76
Signaling in the St. Louis Tunnel ... 76
Foreign Railroad Notes ... 77
Train Accidents in the United States in December ... 77
Preservation of Ties ... 78
New York State Canal Situation ... 79
British and American Exports of Locomotives ... 79
Pooling Locomotives ... 82
Fast Trains in Europe ... 82
The Nicaragua Canal ... 83

GENERAL NEWS:
Technical ... 83
The Scrap Heap ... 84
Locomotive Building ... 85
Car Building ... 85
Bridge Building ... 86
Meetings and Announcements ... 86
Personal ... 89
Elections and Appointments ... 89
Railroad Construction ... 89
General Railroad News ... 88

Contributions

Freight Yards Again.

TO THE EDITOR OF THE RAILROAD GAZETTE.

There seems very little to say about freight yards since you printed Mr. Cushing's article on the subject. Certainly nothing has been printed on this side of the Atlantic covering the ground so thoroughly. It is to be feared, however, that the very fullness of the paper and the elaborateness of the plans may scare off from the subject certain men who want to improve their yards but who cannot afford to make a perfect yard at once. It is conceivable that on reading the first "principle" stated, viz., "(1) The yards should be between the main tracks," such a man might dismiss the whole paper at once as inapplicable to a single track road. This would be a great mistake, for there is much in the paper that is applicable to all yards. The second "principle," covering reception tracks, is applicable almost everywhere, and another general principle, that the cars should be kept always in forward movement, is brought out in the end of condition 3.

This latter principle is probably applicable in every yard large enough to warrant the assignment of a switch engine, and in my opinion should head the column of principles. When once this principle is admitted, it compels a separation of the receiving and classification yards with ladders so arranged that every track of the receiving yard will lead into every track of the classification yard. Then if the trains are to leave the yard with cars in any particular order the same principle compels the adoption of gridirons and starting lines.

Next in importance to the adoption of these two principles, or one principle if you prefer, comes careful study of the light locomotive and caboose movements, noted in Mr. Cushing's 4 and 11. With a proper regard for these and a full consultation of the yardmasters, as suggested by Mr. Cushing, you can hardly fail to have a good yard.

I trust it will not be thought invidious if I call attention to the fact that in different parts of the paper three terms are used for the same thing, "sorting lines," "lancing yard" and "gridirons." This is the more a pity as such yards are a comparative novelty here.

Although the subject has been carefully studied in America, as Mr. Cushing shows, for fully ten years, there is, with a possible single exception, no yard here which economically provides for the placing of cars in freight trains in given order. Even in yards properly designed for the receiving of trains and classification of cars this "station order" matter has been neglected, and the few trains whose cars are put in order are "made up" by the old and wasteful method of back and forth switching.

Under these circumstances it is to be regretted that Mr. Cushing does not say how he means to operate his "lancing yard." The grade of 0.88 per cent. would hardly seem to be enough to start cars by gravity, so that it is to be supposed that he proposes to work it by poling, as he does his classification yard. Might I suggest here that the "hump" arrangement recommended earlier by Mr. Cushing might be successfully used in such a lancing yard? It has been a question with me for some years whether we shall ever be able to operate gridirons successfully with our heavy cars. In Europe, with their straight gravity yards and with small cars with brakes on the sides it is practicable for men on the ground to apply the brakes, using the precautions of "shoes," "sand-tracks" and "chain-brakes" to prevent runaways. But with our brakes there must be a man on top of each car to control it if the cars are to be poled at the usual high speed. With the numerous "cuts" probable in a "lancing yard" it would hardly seem practicable to provide enough brakemen to ride all the cars, while the alternative of setting men to "catch" the cars seems hardly safe. Indeed, this dilemma has already interfered with the working of yards designed for poling. With a "hump" however it would seem that cars could move at such low speeds that they could be readily caught if, indeed, in the short length of a gridiron they could not be trusted to catch each other.

I trust that this will not be considered a criticism of Mr. Cushing's paper, which is admirable for the purpose for which it was intended. I only regret that he did not make it still fuller by giving the plan of the yard which was actually built as well as the ideal yard. G. F. J.

Classifying Locomotives.

Baltimore & Ohio Southwestern R. R. Co.,
Cincinnati, Ohio, Jan. 5, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

The idea for classifying locomotives in a systematic way, suggested by "Roadmaster" in your number of Dec. 7, and further developed by "Superintendent" in that of Dec. 28, appears to me to be very good. One trouble with both of the schemes suggested would seem to be in the difficulty in enunciating the various combinations, as for instance, the arrangement shown in your diagram would have to be read "small A capital A small A."

Might I suggest that a combination of the two methods already suggested would do away with this difficulty. Represent small wheels by numbers and large wheels by letters. Taking the locomotives represented in your previous diagrams in the order in which they there appear, the resulting combinations would be read "1-A-1, 2-A-1, B, 2-B, C, 1-C, 2-C, 1-D, 2-D, 1-E, 2-B-1."

C. LEWIS.

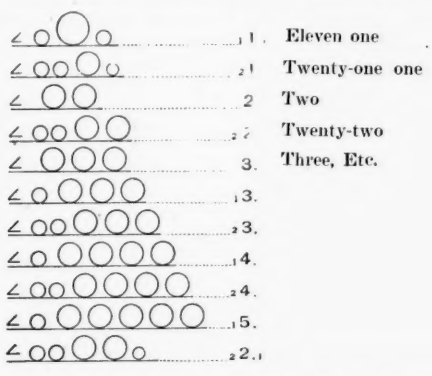
January 3, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Allow me a word in reply to "Superintendent's" letter in your issue of Dec. 28.

The difference in the sizes of figures shown in designating the classes of engines in my memorandum, published Dec. 7, was made to show the connection between the sizes of the wheels and their relative location, but it is not essential that this difference be shown, in practice, either in figure or speech, and the object would be defeated if letters were used to show the number of leading, driving or trailing wheels.

The classes in the order shown would be numbered:



The system will be only limited when the number of drivers on a side reaches ten; the unit figure always showing the number of driving wheels. To use this system the only prerequisite is to remember that you are looking at the south side of a west-bound engine.

ROADMASTER.

Combinations and Our Present Duty.

New York, Jan. 29, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

The Interstate Commerce Commission has issued the usual advance sheets of its annual report. Under the head of "Railway Combinations" much attention is given to the various leases, purchases, stock acquisitions, communites of interest and other forms of co-ordinated management which are so prominent a feature in the railway situation at the present time. In stating the inducements for this movement, the Commission hits the nail upon the head with noteworthy frankness, remarking first, that competition between railways is especially destructive; second, that slight improvements in traffic returns produce large aggregate results; third, that railroad properties may be combined with exceptional ease; and fourth, that the statutes of the land operate to compel such combinations.

The bearing of the last point upon future legislation is so direct that the precise language used by the Commission should be quoted.

"In addition to these inducements, the statutes of the land operate to produce the same result. Many years ago the railway managers found it necessary, in what they believed to be legitimate self-protection, to form pooling contracts. They still believe that the right to make and enforce such contracts is a proper and essential one, but the Interstate Commerce Act renders the formation of these contracts not only illegal but criminal. The act also provides that carriers shall publish their rates and adhere to them, but the anti-trust act, as interpreted by the courts, renders any agreement with reference to the making or maintaining of interstate rates a crime. If carriers are to make public their rates and to charge all shippers the same rate, they must, as a practical matter, agree to some extent with respect to these rates. When railway managers believe that the law forbids in one act what they deem necessary to the observance of another, the obvious tendency of the enforcement of such a law is to lead to the discovery, if possible, of some way in which it can be avoided. So if there can be no agreement in the operation of independent railways, it seems inevitable that there will be unity or agreement in their ownership."

This is sound and sane. Federal legislation is chiefly responsible for the present movement in the direction of railway combinations. To be specific, associations of title and of interest among competing railways are compelled by two Federal laws; one, the anti-pooling provision of the Interstate Commerce law, and the other, the anti-association provision of the Anti-Trust law; both in their operation being inconsistent with any conceivable scheme of statutory regulation. This has long been thoroughly understood by students of the question, and it is refreshing to see it clearly recognized and stated by the Commision.

Our industrial system is based upon the efficiency of competition. Socialism aims to extinguish competition and establish a parental government by the state. Like every other natural force, competition may readily become excessive; railways are particularly subject to the possibility of its excess and to injurious results therefrom. Railway pools as heretofore employed in this country and as still customary in other countries afford an internal regulation of competitive extravagancies; they were forbidden in the United States by an unfortunate and inconsistent section in the Interstate Commerce law. Thereupon railway associations were devised as a less effective form of similar internal regulation. These also were forbidden by the Anti-Trust law as construed by the Supreme Court, which conceived that extreme competition between railways was the legislative demand. But uncontrolled railway competition means the extinguishment of railway revenue. Legislative conditions have thus become such that railroad values cannot be preserved, and railroad service cannot be performed under the Federal laws applicable to the business of railroad transportation; hence "Railway Combinations" became the only recourse.

It is easy now to understand the genesis of the legislative error; there were dangers perceptible in pools; sometimes injustice resulted from them. Congress might have acted with a view to forefend the dangers and restrain the injustice, but instead of doing this it adopted the policy of "thorough" and destroyed pools altogether. When there are worms' nests in an apple tree the wise farmer does not cut down the tree, but removes the nests. A like thing occurred in respect to the spasm of anti-trust legislation in which Congress, as well as state legislatures, afterwards became involved. There were evils to be apprehended from what were then called trusts, being arrangements under which competing manufacturers controlled the excesses of their competition by agreements respecting prices, selling methods, territories, etc. Instead of enacting laws to restrain and prevent the apprehended evils the axe was applied, and all such arrangements were made illegal. The effort to restrain competitive excesses being thus absolutely forbidden, competitors were practically and logically driven to protect themselves by the physical amalgamation of competing properties, which legislatures could not prevent; hence arose the wave of consolidating competing manufacturing establishments into single gigantic corporations which swept across the country two or three years ago. If legislation had been only regulative in its scope these combinations would not have been considered desirable; but the legislation was prohibitory; the parties often were loath to enter the combinations, but could see no other way to preserve their property without violation of law; hence it is quite true to say that the Anti-Trust law was the parent of the amalgamation of title, which is the more modern form of the industrial trust; and it is equally true that the Anti-Pooling and Anti-Trust laws together have given special impetus to the railway combinations of 1900 and 1901.

In view of present conditions it is impossible to resist the feeling that it would have been far more consistent with the interests of the general public to establish laws that would have permitted competing railways to maintain their independence under arrangements suitably framed for the restraint of competitive excess. Legislation has played into the hands of capitalists by affording a logical reason for railway combinations. Even now the combination movement may be checked by a reversal of the legislative attitude; that is, by authorizing measures under which the individual existence of competing railways may be preserved. Undoubtedly this should be done, and the Interstate Commerce Commission makes this recommendation. The potential evils of absolute combination are undoubtedly greater than the potential evils of pools and associations.

The Commission now says respecting combination that the "danger lies in the fact that the only check upon the rate is thereby removed." This was the very danger apprehended from pools and associations, only that it is now more dangerous and more obvious. The true remedy is the same as before; not prohibition of the thing but regulation of the result.

In fact prohibition of railway combinations is impos-

sible because railway corporate organizations are creatures of the individual states and cannot be controlled by Federal laws. Regulation, therefore, is now the only possibility. The danger is that such new legislation as may be devised by Congress will go too far; laws which attempt too much are sure to fail or to be evaded. It is the evils that exist which should be dealt with, not necessarily the evils which may be apprehended nor the facts out of which such evils grow. The experiences above referred to show how failure arises from laws that are too extreme in their provisions.

Now let us assume for a moment that a present danger exists in the fact that railway competition is becoming less and less and hence that extravagance in railway rates may arise. The statement of the Commission that "the only check upon the rate" is removed by railway combinations is, of course, inexact and extravagant. If there was only one railway company in the land (a situation that certainly is not soon to be apprehended) there would still remain the principal checks upon the rates which now exist, viz., the competition of markets as well as that of other carriers. But it is true that by the combination of two competing lines one "check upon the rate" is removed, and it seems to be right and proper that a corresponding degree of protection should be established. This means a protection against excessive rates when accomplished through the agency of the associations and conferences which it is now proposed to authorize. It does not mean control over rates generally. Such excessive rates, if any, as now exist and such advances in rates by classification changes as the Commission discusses at great length, furnished the occasion for the protection which was given by the Interstate Commerce law as first enacted. In that law unreasonable rates were made illegal. If, in the opinion of the Commission, an unreasonable rate exists, it is its duty to apply to the Court for its suppression. This plain remedy has seldom, if ever, been employed. The Commission has assumed that it would do no good to make such an application unless it was coupled with the nomination of the future rate, a power which the law did not confer upon either the Court or the Commission.

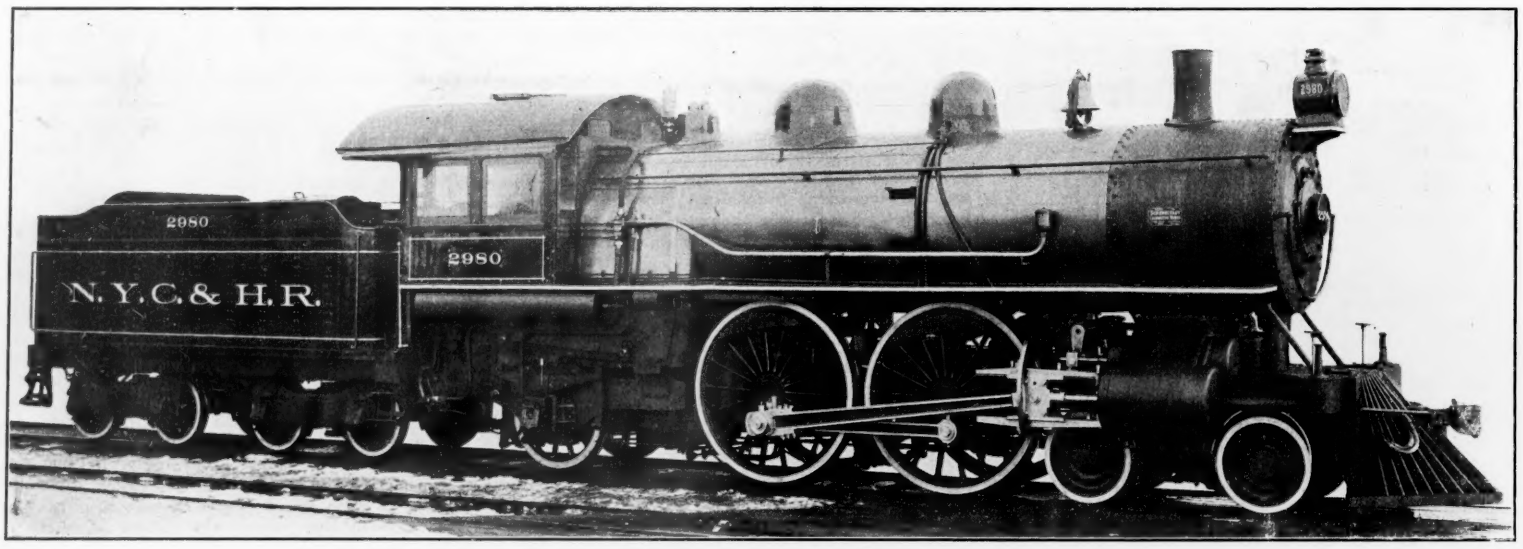
Many students of the subject believe that the employment of the existing statutory grant of judicial power would be adequate to remedy such evils of excess in rates as now exist, or as are likely to exist under properly regulated railway agreements. The Commission does not so believe, but on the contrary asserts that no remedy will be fully adequate short of giving that body absolute control over all railway rates, traffic, rules and regulations, classifications and divisions of rates upon joint business. The remedy which it proposes would surely be worse than the disease; it would repeat and intensify the errors of the past. It would introduce a bureau for the control of railway charges, which, when coupled with the other askings of the Commission in respect to railway equipment and railway accounts, would practically accomplish a complete revolution in the direction of socialism as applied to the great industry of transportation; railway managers would find little left for them to do beyond the payment of their necessary vouchers and interest coupons.

The case now presented is clearly one for candid and thoughtful consideration and debate. Very much has been said from the side of the Commission; very much may be said in opposition to their views. It is a case where parties may honestly hold divergent ideas in respect to the methods to be employed. Some form of new legislation is desirable. The subject is one that calls for conferences and conciliation rather than for the shaking of fists. It is a relief to find in the statements of the Commission above alluded to an apparent disposition to treat this difficult subject as one upon which the last word has not yet been said, and there now seems to be some reason for hoping that an agreement may be reached upon some middle course in respect to new legislation which for a time at least may ameliorate the wrongs and inconsistencies that now exist in our Federal statutes.

ALDACE F. WALKER.

The New Class I Central-Atlantic Type Locomotives—New York Central Railroad.

The development of Class I, eight-wheel locomotives of the New York Central railroad was illustrated in the *Railroad Gazette*, Oct. 26, 1900. In speaking of Class I-3, only two of which were built, to haul the Empire State Express, it was said that those engines were but a step in the development of a type that would later take a prominent place on the road. The more important design has been completed and some of the engines are at work. There has also been a complete re-classification of engines and the old Class I engines have not only been superseded in class name, but will soon be superseded at work, and the new Central-Atlantic type locomotive, here illustrated, will pull the Empire State Express, to which another car will probably be added.



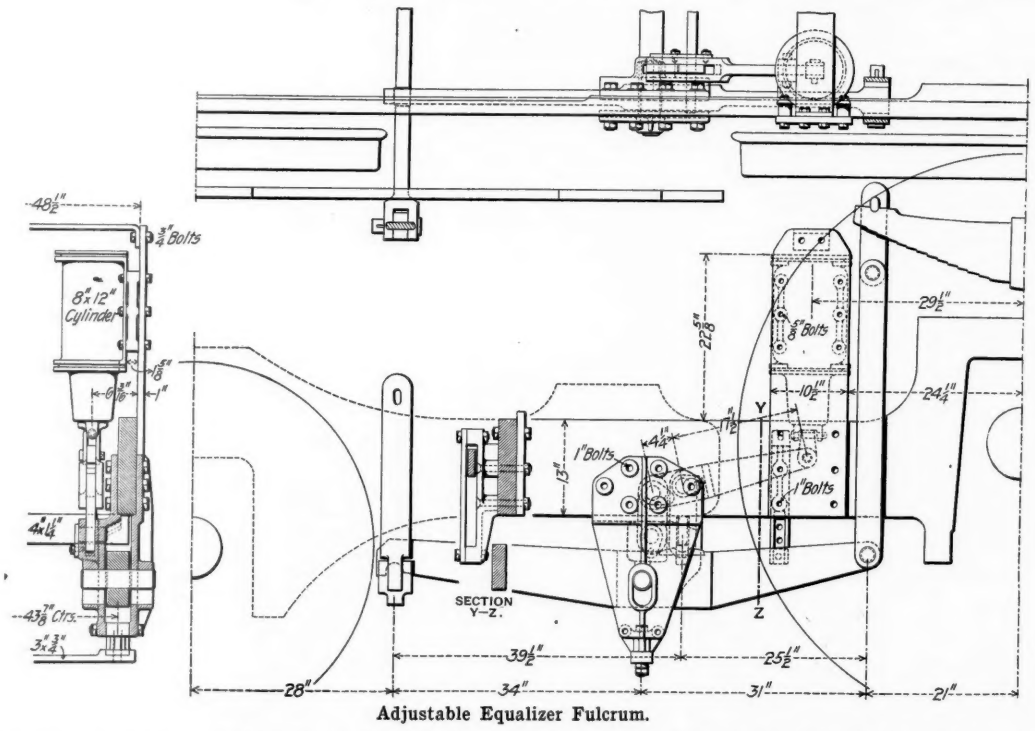
The Central-Atlantic Type Locomotive—New York Central Railroad.

Under the new classification, old Class I engines become Class C, and the Central-Atlantic type becomes Class I. It is expected that within two years all Class C engines, of which, for example, the famous engine No. 999 is one, will be replaced by the new Class I, and that all heavy express work on the main lines will be done by the new engines. There are now six of them at work and five more of the present order for 20 will be finished in the first week in February. For the present these engines will be about evenly distributed on the Hudson and the Mohawk divisions. The new design has received strong indorsement by motive power men of other railroads having locomotives built at Schenectady. Since the first of these engines came out, there have been two requests made to have pending orders for passenger locomotives changed to conform to the Central-Atlantic design; another railroad company asked that an option for such change be given them in a contract for passenger locomotives, and a fourth, similar request, applied to an order for freight locomotives.

It may be timely to say here that the Schenectady Locomotive Works, the builders of these passenger engines, are also building 20, two-cylinder compound consolidation freight engines with wide fire-boxes, and boilers almost the counterparts of these heavy passenger engine boilers; the weight on drivers to be about 163,000 lbs., and the cylinders closely equivalent to 21½ in. x 34 in. They will also build 30 simple consolidation locomotives having about 127,000 lbs. on drivers, and to be used on the Pennsylvania division. The first of the two-cylinder compounds was finished last week. One of these locomotives and engine No. 2,999 of the new Central-Atlantic type, will be exhibited at the Pan-American Exposition at Buffalo.

The new passenger locomotives were designed by Mr. A. M. Waitt and his staff in consultation with Mr. J. E. Sague, Mechanical Engineer of the Schenectady Locomotive Works, from all of whom we have received information in preparing this description.

The engines are remarkable, first for the great amount of heating surface they carry and the relation of the grate area thereto, being better provided with heating surface than any other built for similar duty. They lack but 300 sq. ft. of having as much heating surface as the largest locomotives in the world, the Pittsburgh, Bessemer & Lake Erie consolidation of the 150 Class, having 3,805 sq. ft. to the Central-Atlantic's 3,505 sq. ft.

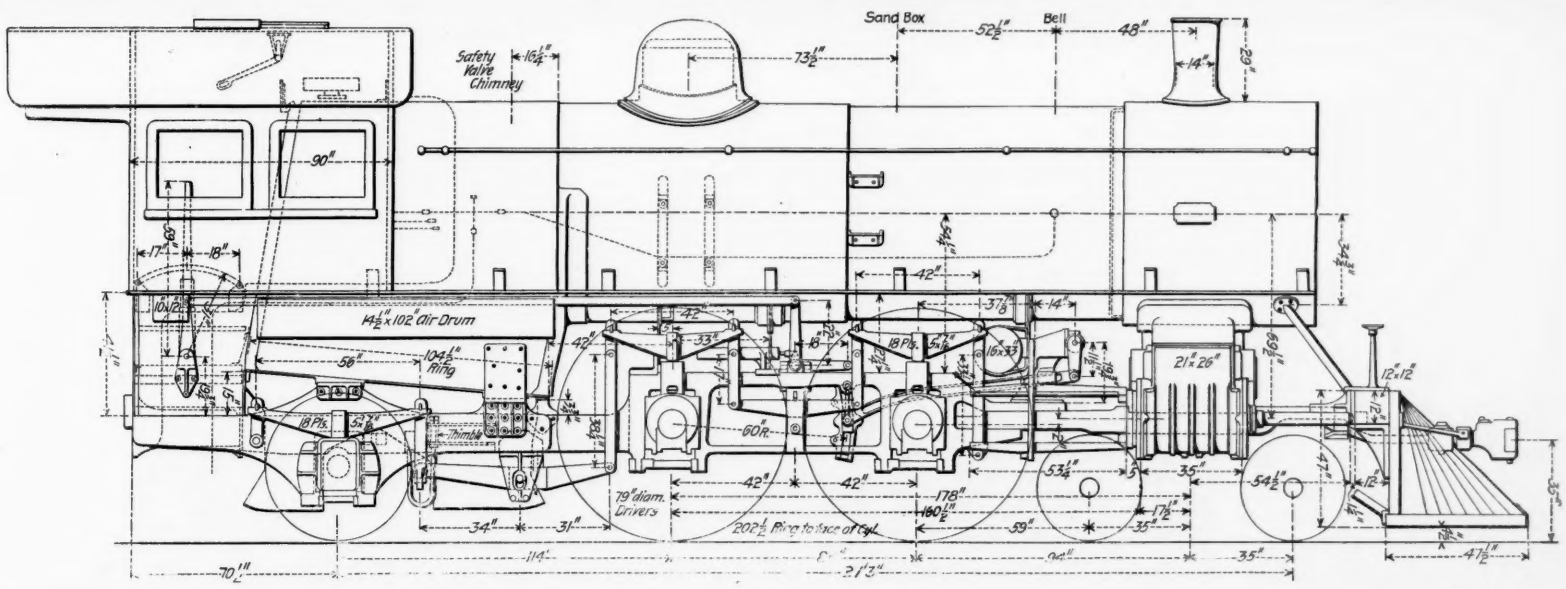


Adjustable Equalizer Fulcrum.

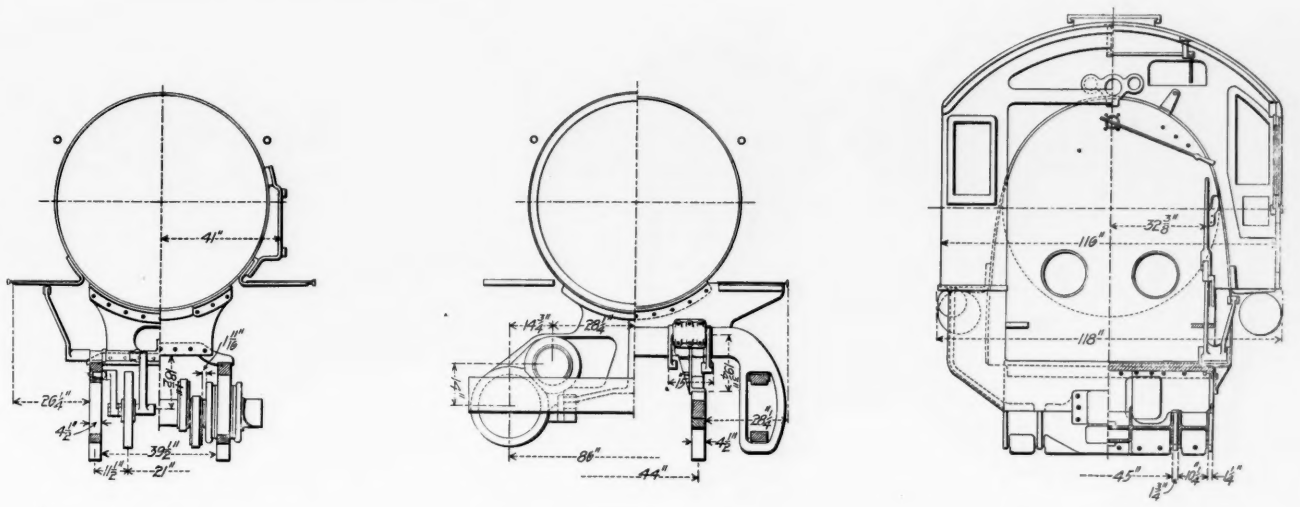
The relations of grate area, heating surface and cylinder volume have been given careful attention, and the traction increasing device, by which weight is shifted from trailing wheels and engine truck to the driving wheels gives these locomotives distinct individuality in the United States. The design, as a whole, is the materialization of ideas tentatively discussed by Mr. Waitt with officers of the Schenectady Locomotive Works something more than a year ago.

The driving wheels have steel centers and are 79 in. in diam. over tires. The driving boxes are cast-steel. The engine frames are wrought iron, finishing in plates at the rear as illustrated. The engine deck plate is cast steel. The trailing wheels are 50 in. in diam., with 44-in. cast-steel centers. The trailing axle is not radial but there is some play in the pedestals. The journals for trailing wheels are 8 in. in diam. x 14 in.; driving axle journals, 9½ in. in diam. x 12 in., and engine truck journals 6¼ in. x 10 in. The main crank pin is 6½ in. in diam. x 7 in., and the cylinders are 21 in. in diam. x 26 in.

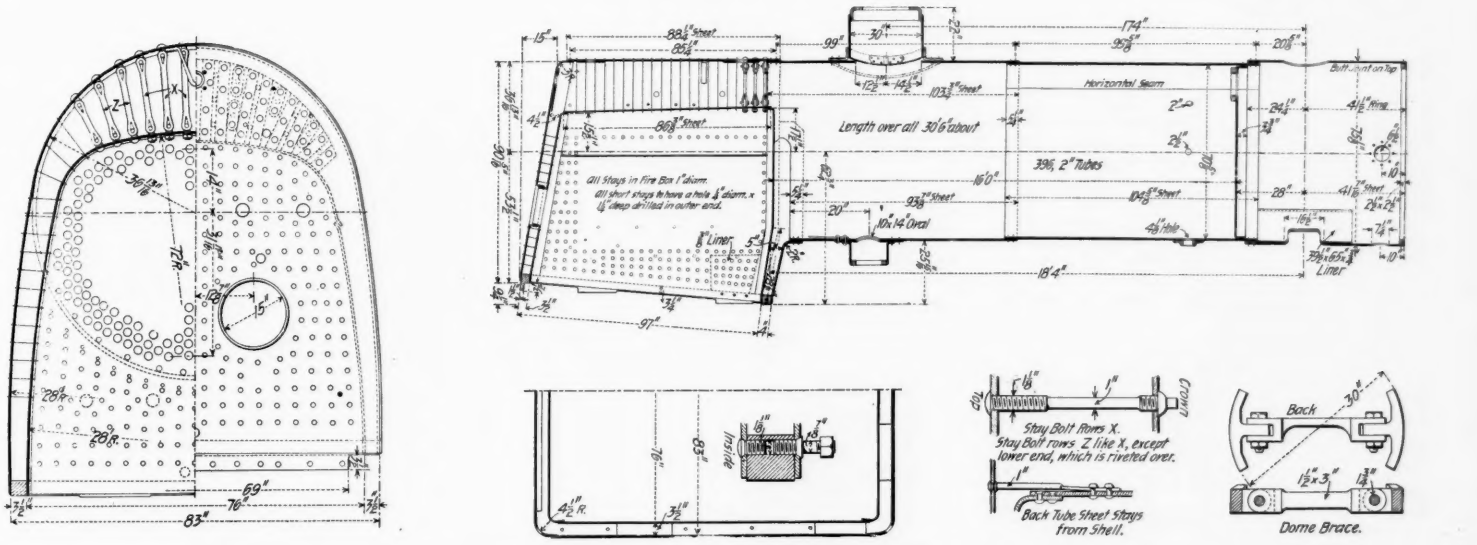
The total weight of engine in working order is 176,000 lbs., of which about 95,000 lbs. is normally on the drivers, 42,600 lbs. on the engine truck, and 38,400 lbs. on the trailing wheels, When the adjustable fulcrum is shifted



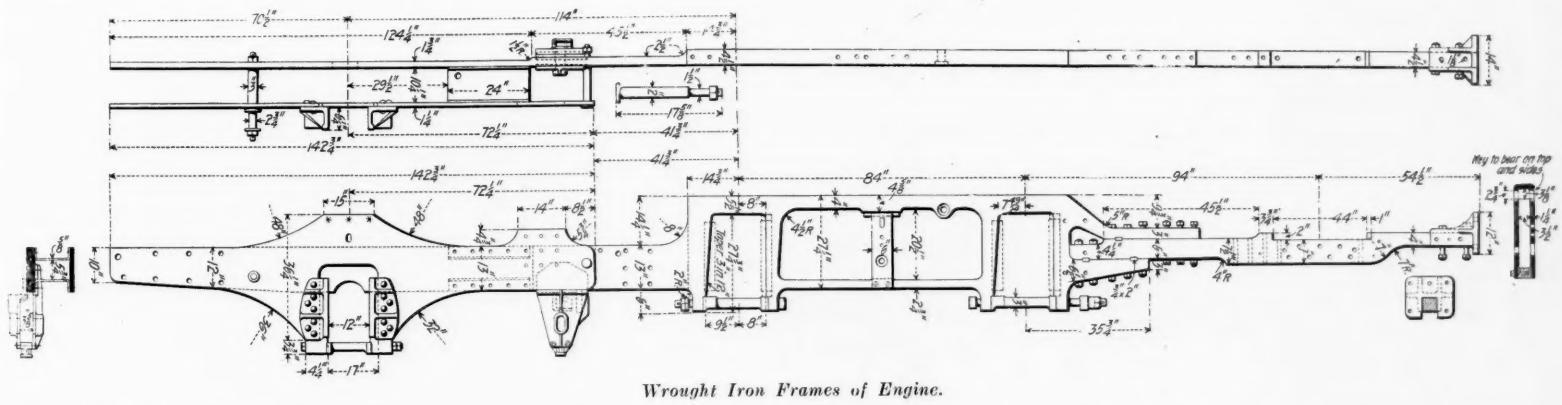
General Elevation of Engine.



Engine Elevations and Sections.


All Stays in Fire Box 1" diam.
Length over all 30'6" about
396, 2" Tubes
Horizontal Seam
Butt Joint on Top
Liner
Stay Bolt Rems X.
Stay Bolt rems Z like X, except lower end, which is riveted over.
Back Tube Sheet Stays from Shell.
Back
Dome Brace.

General Design—Elevations, Sections and Details of Boiler.



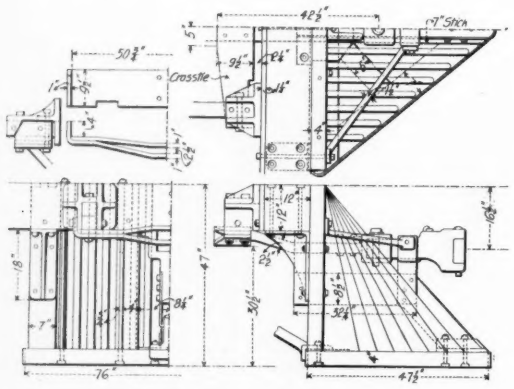
Wrought Iron Frames of Engine.

Built by SCHENECTADY LOCOMOTIVE WORKS.

The Central-Atlantic Type Locomotive—New York Central Railroad. MR. A. M. WAITT, *Supt. Motive Power and Rolling Stock.*

to put about 10,000 lbs. additional weight on the drivers the weight distribution becomes 104,800 lbs. on drivers, 37,000 lbs. on engine truck, and 34,200 lbs. on the trailing wheels. The normal traction, estimated with 85 per cent. of the 200 lbs., working steam pressure, and based on adhesive weight, is 23,725 lbs. It is calculated that with the traction increasing device in action the tractive effort is increased to 25,350 lbs. The additional adhesive weight is taken in part from both the engine truck and the trailing axle, in the proportion previously given in weights. This result is effected by using main reservoir air pressure in the cylinder shown in the detail drawing of the adjustable equalizer fulcrum, thus bringing into play the forward fulcrum point that gives the trailing wheels the long end of the equalizing lever. It is, of course, within the control of the engineer, from the cab. The practical demonstration of usefulness of this arrangement is daily seen on the West Albany Hill. Any of the old Class I engines hauling a six-car passenger train west out of Albany had a helper up this grade. The Central-Atlantic type, Engine No. 2,980, for example, here illustrated in half-tone, puts on the traction increaser and, unaided, makes time with six cars.

The boiler is straight-top with wide fire-box and has two fire dbors. The crown and grates are sloping. There



Pilot and Coupler Attachments.

is a mud drum, the center line of which is 20 in. ahead of the throat. Radial stays are used except where slings are shown in the three front rows of crown stays. The total heating surface is 3,505.17 sq. ft., and the grate area 50.32 sq. ft. The ratio of grate area to heating surface is as 1 to 69.65 and the ratio of cylinder volume to heating surface as 1 to 336.38 sq. ft. In this connection it is to be remarked that the conclusion reached by the committee of the Master Mechanics' Association in 1897 while considering the relations of grate area and heating surface, still sounds so true a note on the requirements for successful soft coal burning, after all the changes in tractive duty that have come about. The dimensions of the fire-box are: Length, 8 ft. ⅛ in.; width, 6 ft. 3⅜ in.; depth front, 80¼ in.; depth back, 69 in.

In the various locomotives that will now be supplanted by these heavy ones the relations of cylinder volume to heating surface have ranged from, as 1 to 231, up to as 1 to 305, all of which, it may be seen, was above the Master Mechanics' recommendations of 1 to 200 for soft coal, but none bore as high ratio as that of the new engines. The indications from the several engines now working are that steam will be abundant at low fuel cost, and that the liberal dimensions of pins and journals are going to insure cool running. Thus far there has been no heating of journals and the trailing wheel journals particularly are working well.

The valves are 12-in. pistons with inside admission. They have 1-in. steam lap, ⅛-in. exhaust clearance, and are set line and line in full gear for both motions, the greatest travel being 6 in. There is given herewith a table of data pertaining to the setting of valves on engine No. 2,979, one of this class. In the column of notches of the quadrant notch No. 1 is evidently "the corner."

Valve-Setting of N. Y. C. & H. R. R. Engine No. 2,979.

No. of Notches	LEAD		VALVE OPENS		CUT-OFF	
	Front Stroke In.	Back Stroke In.	Front Stroke In.	Back Stroke In.	Front Stroke In.	Back Stroke In.
Left 1	0	0	2	2	23	23 1/16
Right	0	0	2	2	23 1/16	23 1/16
2	1/8	1/8	1 1/4	1 1/4	21	21 1/16
3	5/32	5/32	1 5/16	1 5/16	19	19
4	3/16	3/16	1 3/16	1 3/16	17	17
5	7/32	7/32	1 1/8	1 1/8	15	15
Left 6	1/4 S *	1/4 S	1 1/16	1 1/16	13	13
Right	1/4 S	1/4 S	1 1/16	1 1/16	13	13
7	1/4 F	1/4 F	1	1	11	11
8	5/32 S	5/32 S	1 1/32	1 1/32	9	9
—	3/32	3/32	1 1/64	1 1/64	6	6 1/16

*"S" or "F," Scant or Full.

Road tests will be made as soon as convenient and it may then be possible to give further information. Interesting details, not elsewhere especially referred to, may be found in the accompanying specifications:

GENERAL SPECIFICATIONS.

Description.

Type	Central-Atlantic
Engine truck	Swing bolster
Number	2,980
Name of builder	Schenectady Locomotive Works
Name of operating road	N. Y. C. & H. R. R.
Gage	4 ft. 8½ in.
Simple or compound	Simple
Kind of fuel to be used	Bituminous coal
Weight on drivers	95,000 lbs.
Weight on trail wheels (normal)	38,400 lbs.
Weight on truck wheels (normal)	42,600 lbs.
Weight, total	176,000 lbs.
Weight, tender, loaded	110,900 lbs.
Weight, tender, empty	48,900 lbs.

General Dimensions.

Wheel base, total, of engine	27 ft. 3 in.
Wheel base, driving	7 ft.
Wheel base, total (engine and tender)	53 ft.
Height, center of boiler above rails	9 ft. 3 in.
Height of stack above rails	14 ft. 10 in.
Heating surface, fire-box	180 sq. ft.
Heating surface tubes	3,298.08 sq. ft.
Heating surface water tubes	27.09 sq. ft.
Heating surface, total	3,505.17 sq. ft.
Grate area	50.32 sq. ft.

Wheels and Journals.

Drivers, number	Four
Drivers, diameter	79 in.
Drivers, material of centers	Cast steel
Driving boxes	Cast steel
Truck wheels, diameter	36 in.
Trailing wheels, 50 in. diam.	44 in., cast steel centers
Journals, driving axle, size	9½ in. diam. x 12 in.
Journals, trailing axle, size	8 in. diam. x 14 in.
Journals, truck axle size	6¼ in. diam. x 10 in.
Main crank pin, size	6½ in. diam. x 7 in.
Side rod journals	Main, 7 in. x 4¼ in.; front, 5 in. x 4 in.

Cylinders.

Cylinders, diameter	21 in.
Piston, stroke	26 in.
Piston rod, diameter	3¾ in.
Kind of piston rod packing	U. S. metallic
Steam ports, width	1⅝ in.
Exhaust ports, width	2½ in.
Bridge, width	1⅞ in.

Valves.

Valves, kind of	Piston, 12 in. diam., inside admiss.
Valves, greatest travel	6 in.
Valves, steam lap	1 in.
Valves, exhaust clearance	⅛ in.
Valves, lead in full gear	0 in.
Valves, lead at 6 in. cut-off	9-32 in.

Boiler.

Boiler	Straight, with wide fire-box
Boiler, working steam pressure	200 lbs.
Boiler, material in barrel and outside of fire-box,	Carbon steel
Boiler, thickness of material in barrel, first and second courses, ¾ in.; throat ¾ in.; sides and top, 7-16 in.; back head, ½ in.	
Boiler, outside diameter of barrel, first ring	72 in.
Seams	Horizontal, butt joint, sextuple riveted, welt strips
Seams, circumferential	Double riveted
Thickness of tube sheets	Front ⅝ in., back ½ in.
Thickness of crown sheet	⅜ in.
Crown sheet stayed with	1⅛ in. radial stays
Dome, diameter, inside	30 in.

Fire-Box.

Fire-box, length	8 ft. ⅛ in.
Fire-box, width	6 ft. 3⅜ in.
Fire-box, depth front	80¼ in.
Fire-box, depth back	69 in.
Fire-box, material	Carbon fire-box steel
Fire-box, thickness of sheets	Sides 5-16 in.; back ⅜ in.
Fire-box, brick arch	On water tubes
Fire-box, water space, width, Front, 4 to 5 in.; sides, 3½ and 5½ in.; back, 3½ and 4½ in.	
Grate, kind of	Rocking, N. Y. C. standard
Ash pan	Plain, with dampers, front and back

Tubes.

Tubes, number of	396
Tubes, material	No. 12 B. W. G. charcoal iron
Tubes, outside diameter	2 in.
Tubes, length over sheets	16 ft. 0 in.

Smoke-Box.

Smoke-box, diameter, outside	75⅛ in.
Smoke-box, length	69 7-16 in.

Other Parts.

Exhaust nozzle	Single, permanent
Exhaust nozzle, diameter	5 in., 5¼ in., or 5½ in.
Stack	Taper
Stack, least diameter	14 in.
Stack, greatest diameter	15½ in.
Stack, height above smoke-box	2 ft. 5 in.

Tender.

Type	Swivel trucks
Tank capacity for water	5,000 gals.
Coal capacity	Ten tons
Kind of material in tank	Tank steel
Type of under-frame	10-in. steel channels
Type of truck	Fox pressed steel, bolster type
Diameter of truck wheels	36 in.
Diameter and length of axle journals	5 in. x 9 in.
Type of back drawhead	Gould coupler
Type of water scoop	Air operated

Names of Makers of Special Equipment.

Bell ringer	Sansom
Front and back couplers	Gould Coupler Co.
Safety valves	Three Consolidated, 2½ in., muffled
Steam heat equipment	Consolidated Car Heating Co.
Reducing valves	Mason
Sanding devices	Leach
Injectors	Nathan Mfg. Co. (Monitor, No. 11)
Driver brake equipment	Westinghouse-American
Tender brake equipment	Westinghouse-American
Tender brake-beam	National Hollow
Air pump	Westinghouse, 9½ in.
Air signal	Westinghouse
Headlight	Dressel 16 in., round case
Other specialties	Franklin sectional lagging on boiler and cylinders; boiler head lagged; removable section over stay bolts.

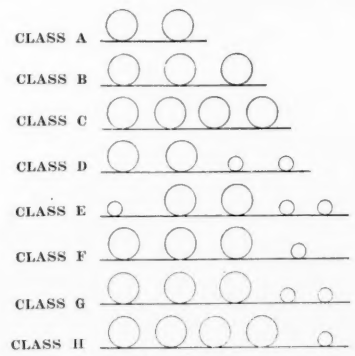
The railroads seem to be regarded by the Japanese as a particularly fit deadly weapon with which to commit suicide. During the first seven months of 1900, on a system of only 3,633 miles, the total number of fatalities was 73, and of these 55 were suicides.

Locomotive Classification on the Pennsylvania.

Recent letters in the *Railroad Gazette* have stirred up a mild interest in the matter of classification of locomotives. Two or three years ago we published an account of the new classification adopted by the Pennsylvania, not, however, giving any diagrams. As the subject seems to be interesting we reprint now the official circular for the new classification issued by the General Superintendent of Motive Power, April 26, 1897, and re-issued July 1, 1900. The circular is accompanied by tables (which we do not reprint) showing in considerable detail dimensions, weights, etc., of the various engines, with their designation under the new and under the old classification. The circular explains itself very completely.

For the convenience of the Motive Power Department and to more clearly designate the different classes of locomotives in the equipment, it has been found necessary to abandon the old alphabetical classification and substitute a new classification, using a primary letter to designate the type, numbers to designate the different classes of any type, and small suffix letters to designate modifications of any particular class of locomotives.

In this classification the locomotives are grouped into typical classes according to the number of wheels used under them, irrespective of the service for which they are intended, as follows:



Under these eight general types the different classes of locomotives are classified as follows:

Class A 1, formerly class Q, 44-in. drivers.
Class A 2, formerly class Q, 50-in. drivers, with tender.
Class A 2 a, formerly class Q, 50-in. drivers, without tender.
Class A 3, formerly class U.

Class B 1, formerly class F. Now out of existence.
Class B 2, formerly class H.
Class B 3, formerly class M, old type.
Class B 4, formerly class M, type of 1891.
Class B 4 a, formerly class M, type of 1893.
Class B 5, formerly I, converted into six-wheel shifting engines.

Class C, none of this class has been built.

Class D 1, formerly class A bit. Now out of existence.
Class D 2, formerly class B.
Class D 2 a, formerly class Ba.
Class D 3, formerly class C bit.
Class D 4, formerly class C anth.
Class D 4 a, formerly class Ca anth.
Class D 5, formerly class G. Now out of existence.
Class D 6, formerly class K, 78-in. drivers.
Class D 6 a, formerly class K, 72-in. drivers.
Class D 7, formerly class A anth., 68-in. drivers.
Class D 7 a, formerly class A anth., 62-in. drivers.
Class D 8, formerly class N.
Class D 8 a, formerly class O 130 lbs.
Class D 9, formerly class O 160 lbs., 54-in. boiler, 62-in. drivers. Now out of existence.
Class D 9 a, formerly class O 160 lbs., 54-in. boiler, 68-in. drivers. Now out of existence.
Class D 10, formerly class O 160 lbs., 57-in. boiler, 62-in. drivers.
Class D 10 a, formerly class O 160 lbs., 57-in. boiler, 68-in. drivers.
Class D 11, formerly class P 140 lbs., 62-in. drivers.
Class D 11 a, formerly class P 140 lbs., 68-in. drivers.
Class D 12, formerly class P 160 lbs., 54-in. boiler, 62-in. drivers. Now out of existence.
Class D 12 a, formerly class P 160 lbs., 54-in. boiler, 68-in. drivers. Now out of existence.
Class D 13, formerly class P 160 lbs., 57-in. boiler, 62-in. drivers, type of 1892.
Class D 13 a, formerly class P 160 lbs., 57-in. boiler, 68-in. drivers, type of 1892.
Class D 13 b, formerly class P 160 lbs., 57-in. boiler, 62-in. drivers, type of 1893. Now out of existence.
Class D 13 c, formerly class P 160 lbs., 57-in. boiler, 68-in. drivers, type of 1893.
Class D 14, formerly class P 175 lbs., 78-in. drivers.
Class D 14 a, formerly class P 175 lbs., 80-in. drivers.
Class D 15, formerly class T compound.
Class D 16, formerly class L 68-in. drivers.
Class D 16 a, formerly class L, 80-in. drivers.
Class D 16 b.
Class D 16 c.
Class D 16 d.

Class E 1.
Class E 2.

Class F 1, formerly known as mogul simple.
Class F 1 a.
Class F 2, formerly known as mogul compound.

Class G 1, formerly class D.
Class G 1 a, formerly class De.
Class G 2, formerly class E.
Class G 3, formerly class X, 68-in. drivers. Now out of existence.

Class G 3 a, formerly class X, 62-in. drivers. Now out of existence.
Class G 4.
Class G 4 a.

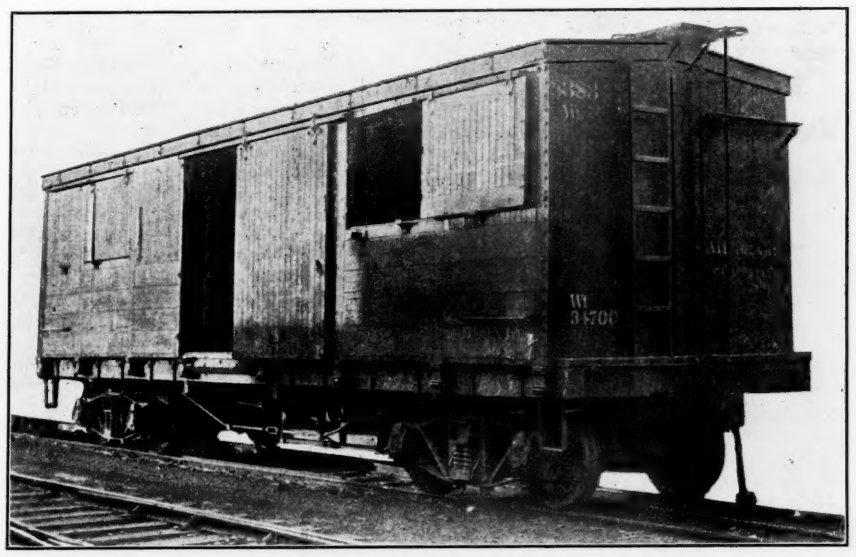
Class H 1, formerly class I.
Class H 2, formerly class S. Now out of existence.
Class H 3, formerly class R, built prior to December, 1889.
Class H 3 a, formerly class R, built after December, 1889.
Class H 3 b, formerly class R, type of 1893.
Class H 4.
Class H 5.
Class H 6.

Future modifications of any of the existing classes will be designated by small suffix letters as previously explained, while entirely new classes of any particular type will be designated by the proper primary letters and numerals.

The principal dimensions and characteristics of the different classes of locomotives are given on succeeding pages, on which are also given both the old and the present classification letters.

The "Handy" Car.

As we have often had occasion to point out combination cars which are designed to be changed into many forms, while having important advantages in theory, really fail because they are complicated and difficult to change from one form to another. If the experience with these cars shows anything, it is that they must be so constructed that their usefulness will not depend upon some employee changing the form of the car to suit the loading. We happen to know of some very ingenious and wonderful cars capable of being changed in a number of ways, which ran for a long time just as they were put in service. Those which were put in service as box cars continued to be used just as ordinary box cars, the stock cars were loaded only with stock and so on. These things are mentioned as the car shown by the accompanying engravings should not be confounded with these combination cars. In this, the "Handy" car complications are avoided by limiting the kinds of service in which it is used, it being adapted for use as a box car and a gondola car, or coal car. This car will be put on the market by Mr. C. L. Sullivan, 1425 Old Colony Building, Chicago. Sample cars have been running for more than a year and confirm the expectations of their designers.



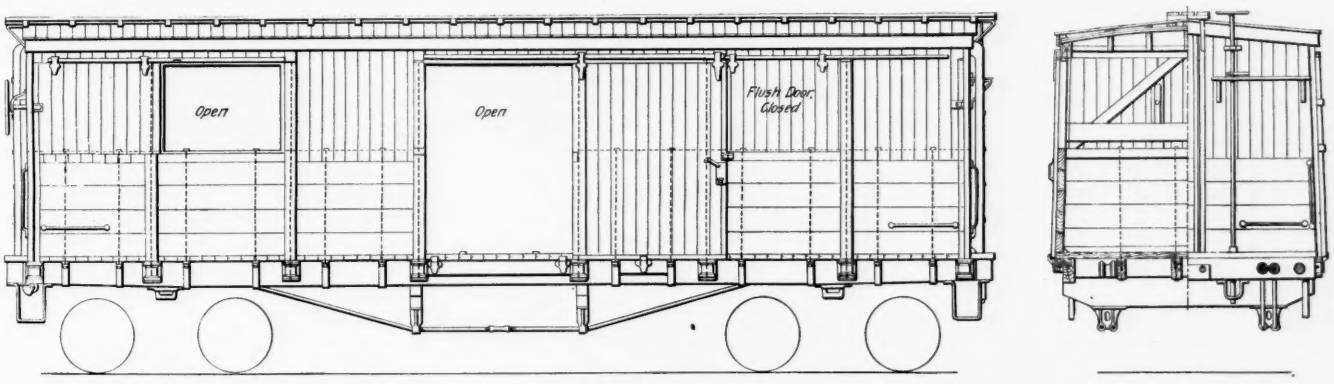
The "Handy" Box Car.

The particularly new features of this car are in the construction of the sides and ends of the box. The roof construction can be anything desired above the carlins. From the floor to the track the construction can be anything desired. The corner posts are angles, and the side and end posts are tees or angles, and the carlins are tees or angles. The posts are secured to the sills of the car by a sort of stake pocket, and the tops of the posts and the ends of the carlins are fastened to the plates by malleable brackets. From the belt rail down, the boards, 2¼ or 2½ in. thick, run lengthwise of the car as in a gondola, but instead of being the full length of the car, they are cut into panels fitted in between these steel posts. In order to make pockets for the ends of the boards a flat plate extends from the belt rail to the floor, thus forming with the flanges of the tees or angles the necessary pockets. Bolts are passed through the flanges of the tees or angles and the ends of the boards and the flat plates. Button-head bolts are used with the nuts on the outside. There are strap bolts similar to those used in gondola cars extending from the belt rail through the ends of the floor and through brackets secured to the sills. The end boards are in one piece, of a length equal to the width of the car, and are secured in a similar manner to the side boards. The door posts are also steel. There is no inside sheathing, and the car is flush on the inside from the belt rail down. The outside sheathing extends from the belt rail to the top of the plate in the usual manner. There are no vertical tie rods on the sides or ends and no angular braces on the sides. There are two angular braces on the ends of the car on the inside. The middle doors are of the usual makes. The auxiliary doors are made to close flush and lock automatically on the inside, thus not requiring seals. The gondola section, in connection with steel posts, is what materially strengthens this car as compared with an ordinary box car.

Increased capacity for freight is obtained by making the walls of the car 2¼ or 2½ in. thick, instead of 4, 4½ or 5 in. as in ordinary box cars. Additional increased capacity is obtained by battering the sides of the car. The size of the roof is determined by the usual method in providing for tunnel clearances, and then instead of running the sides down vertically, as is required in ordinary box cars, the sides are battered outward, and can be 4 to 6 in. wider at the floor line inside than at the roof line between the plates. The reason, it is claimed, that this car will cost no more than an ordinary box car of the same capacity is: First, should any particular box car, used for comparison, be increased to a capacity equal to the Handy car, its cost would be materially increased; second, the use of short lengths of lumber in the Handy car reduces the cost of the lumber $4 to $5 a thousand, and it is not believed that the introduction of steel in the construction would equal the saving in the lumber.

The advantages of this construction would appear to be that a box car is obtained of greater capacity and strength than the ordinary car without increasing the first cost or maintenance charges. It can be used for all kind of materials now loaded in box cars, and beside can be used to greater advantage for loads of coal, or other rough materials ordinarily carried in gondolas. Consequently, it is supposed that such a car would be loaded oftener and make less empty mileage.

In this connection some roads now use box cars for carrying such material as coal, brick, ore and other heavy material, so as to prevent empty hauling in either direction. These box cars are operated under considerable disadvantage in that it costs more for the loading and unloading of materials into and out of box cars than is the case with gondolas. This extra cost of loading coal amounts to at least 5 cents per ton extra and about 5 cents for unloading, the total of which is a fair profit on coal. In addition to this disadvantage of using ordinary box cars for this class of trade, the interior lining of a box car is not as substantial and durable as the sides of a gondola, and is therefore subject to greater damage. As will be seen the Handy car has been designed to meet the objection to the use of a box car for the shipment of coal and other rough material. The lower part is similar to a gondola car, and the upper part forms as complete protection to any lading as does a box car. By means of the auxiliary doorways on either side of the main doorway, it may be loaded with coal by a tipple chute just as readily as a gondola car, and when used for grain it may be more readily loaded at small elevators than ordinary box cars on account of these auxiliary doors. In addition to these features it gives at least 6 in. greater inside width for the same outside dimensions of any box car yet used, and at least 10 in. greater inside width for the same outside dimensions of any gondola having flush sides within the box. Patents have been taken out covering this construction both in this and foreign countries.



The "Handy" Box Car.

The Grand Central Station.

The low-pressure pneumatic interlocking which has been installed in the yard of the Grand Central Station, New York city by the Standard Railroad Signal Company, of Troy, is now in full operation. The mechanical interlocking was abandoned in sections, and for a time both of the cabins, the old and the new, were in service together. This necessitated constant communication by telephone from one to the other; which, with the crowding of trains consequent upon the temporary abandonment of one track, caused numerous delays during the first two weeks of the change. The shortening of the train shed at its inner end has necessitated changes in the tracks at the outer end, which virtually move the whole yard about 75 ft. northward. These changes, involving a number of new switches, also caused some delays. The new cabin is about 100 ft. north of the site of the old one. The old cabin was torn down last week. In the new cabin the upper half of each window is made of green glass, this expedient being employed to soften the light of the sun instead of an awning, such as was used on the old cabin. The Yardmaster's office is in the first story of the new building.

The changes in the headhouse are not yet finished, though the work has been so far completed that most of the new conveniences are now available. The new main waiting room and its accessories, together with the concourse, 30 ft. wide, are finished, and passengers who do not have to buy tickets have convenient access to the concourse and the trains without going through the waiting room. Those coming from the streets on the west side can enter the concourse at the left of the waiting room, and those coming from the south or east can enter at the right. In the annex, or that part of the train shed which is used only for inward trains, the changes in the floor are not yet finished, neither is the addition to the inward baggage room, which addition is about 300 ft. long. The emigrant waiting room beneath the main waiting room is yet to be built.

Persons familiar with the plan of this building, which was published in the *Railroad Gazette* of June 23, 1899, will remember that the outward baggage room, on the west side, occupying the space formerly devoted to the waiting rooms of the Hudson and Harlem divisions of the New York Central, is very narrow and long. To reach the farther end of it from the waiting room a passenger must make a long journey. To mitigate this difficulty the room is divided into sections, and passengers who bring their baggage with them are accommodated in the section nearest the waiting room, checks being given here for either of the three lines using the station. The sections of the baggage room farther north are set apart for baggage which reaches the station in advance of its owner.

Additional crossovers are to be put in between the outer end of the yard and the tunnel; and to provide for these and for other switches in that vicinity a second pneumatic interlocking machine is to be put in.

Compressed Air in New York.

We published, Jan. 11, a summary of the results of working compressed air cars in the City of New York, from Sept. 26 to Nov. 21, showing a total car mileage of 94,583, with 1,017,000 passengers carried. The cost of operation was 17.42 cents per car mile, this being for 20 cars, whereas the power plant could take care of three or four times that number. Since those figures were published we have the record of the 20 cars for the four months ending Jan. 25. In that period the total round trips amounted to 37,408, the car mileage to 205,744, and the passengers carried were 2,201,235.

Within a few days we have had an opportunity to look over the complete records of the service of these cars, which may be seen at the office of the Compressed Air Company in New York, and from these, as well as from some other information and observation, we conclude that the performance of these cars is so satisfactory as to justify a good deal of confidence in the further spread of their use. It is to be expected that an apparatus and system comparatively new should develop weak spots. So far as we can judge the weaknesses developed in this particular service are not incidental to the use of compressed air, and only to a small degree are they the results of defective design or construction. The small difficulties and delays which arise are generally the result of inexperience on the part of the shopmen, inspectors and motormen who are learning to manage a new kind of apparatus. Some of the few difficulties which occur arise also from the nature of the streets which are run through. These streets are narrow and there are many curves, several of which are reversed. A considerable number of these curves are necessary to get around the posts of the elevated railroad structure. Careful records are kept in detail of the work of each car each day, and from these we find that it happens occasionally, not often, that a car gives out on the trip and has to be pushed in. This is attributable to the ordinary accidents which happen to street cars and from which no system can ever escape entirely. It is also to be attributed in some cases to small defects in parts of apparatus such as any machinery is subject to and which can be controlled by inspection. The storage on each car is ample for the service and there is no reason in the nature of the apparatus why a car should ever give out on the route.

Quite recently two of these cars have had their cylinders bored out from 6½ in. to 6¾ in., and it is found that there is an actual economy of air with the larger cylinders. The first of these cars since the cylinder was bored has been running four round trips on one charge of air, and the second one, which is just out of the shop, has made five round trips, or approximately 25 miles on one charge. This was in regular service with an ordinary motorman. The consumption of air with both of these cars is found to have been materially decreased, and we hope shortly to give accurate figures drawn from the actual records. Some new cylinders are being made 7 in. in diameter.

Ballast.

In our issue of July 13, 1900, we printed extracts from the excellent report made by Mr. Feldpauche, Principal Assistant Engineer of the Philadelphia, Wilmington & Baltimore Railroad, to the International Railroad Congress. Mr. Feldpauche reported for the United States on this question at the sixth (Paris) session of the Congress. The question in full is "Properties of good ballast; choice to be made between ballasts of different qualities, regard being paid to the character and the heaviness of the traffic, the cost, etc., effect of the ballast on the condition of the road." The reporter for all countries except the United States was Mr. Bauchal, Assistant Permanent Way Engineer of the French Western Railroad. His report is printed in the October issue of the Bulletin of the Congress, which was lately received. The report is a document of 184 pages, and we regret to say that it is disappointing. The useful information given is in inverse ratio to the length of the document. The reporter starts out with a statement of the following functions that ballast has to perform:

(1) It gives the track a suitable support, and fills up inequalities in the formation level.

(2) It distributes the pressure on the formation level, and reduces the pressure per unit of area.

(3) It acts as an elastic support to the track.

(4) It resists lateral displacement of the track both through its mass and through friction.

(5) It resists longitudinal displacement of the track.

(6) In the case of certain formation levels it acts as a protection against frost.

(7) It protects the wood against excessive dryness or excessive wetness.

So far as we can make out this reporter ignores what is possibly the most important duty of ballast, namely, to provide good drainage. All of the other duties are interfered with if not defeated if the drainage is insufficient.

The reporter takes up these seven different functions and considers each at more or less length. He goes into an analytical study of the pressure on the formation level, and the effect of the ballast in distributing this pressure. He concludes that there is no reason, as far as this pressure is concerned, to give the ballast a greater thickness than about 14 in., and that 17½ in. may be considered as an outside limit. Several German engineers have proposed that the thickness of the ballast should equal the clear space between two sleepers plus 7⅞ in. The analysis appears to have little value.

Another theoretical study to which the reporter devotes 12 pages is on the action of the ballast as an elastic support to the track. He describes at considerable length a number of German experiments to determine deflection of track and roadbed, but appears to have never heard of Mr. P. H. Dudley's observations with the "stremmatograph," and altogether this analysis seems also to have little value.

Observations on lateral displacement of track are described. Hydraulic rams have been used as the basis of apparatus both in Germany and in France to determine the thrust necessary to deform track transversely, and various figures have been arrived at as to how much a track can endure. Obviously, this is dependent upon a good many things besides ballast, as, for instance, the method of seating and fastening the rail. The reporter says that ballast contributes to the lateral resistance of track by virtue of its weight when placed on the sleepers, by virtue of its mass when placed against the ends of sleepers and along sides of rails and by the friction of the tie in the sleeper, all of which is evident. It appears that the French and Germans have made a number of experiments with methods of adding to the surface ties exposed to resist movement laterally. Several companies have fixed metal brackets under the sleepers. The French Northern at one time tried the plan of connecting the ends of sleepers by a series of planks so that a large body of ballast would have to be displaced if the track shifted. Others have attached planks under the sleepers, fixing them to the bottom of the tie by brackets. None of these experimenters appear to have considered the important question of interfering with free drainage; at least the reporter does not mention that as one of the considerations. Still others have driven stakes at the end of the sleepers and on double track have connected the two tracks across by old sleepers. None of these experiments would seem to offer suggestions of much value to American readers.

The chief conclusions arrived at by Mr. Bauchal may be very briefly summed up as follows: The track should be supported with a definite and practically uniform elasticity which should not vary by more than 25 per cent. from the mean elasticity. The compression of a given width of ballast is proportional to its depth and to the pressure on the surface. So far as the roadbed proper is concerned it may be assumed that for practical purposes 9 ft. 10 in. is the greatest depth which we need to consider in taking account of compression. The reporter suggests that if a table of the compressibilities of the earthwork most often met with were drawn out it would be possible to determine the most suitable depth of ballast of a given elasticity. Resistance to displacement seems to be decreased if the banks are widened or if a layer of the ballast is placed on the sleepers. As a rule it is advisable to adopt the English section and put little or no ballast on the sleepers and not pack them at the middle. The resistance of ballast to longitudinal displacement of the track has been little investigated, as is true of its chemical action on the permanent way and rolling stock. The yearly wear of ballast is variable, say, from 2 per cent. to 10 per cent. The best ballast for main lines is hard broken stone; on well laid secondary lines fine materials are preferable, as they are more easy to handle. Slag is a good ballast, coal cinders should be reserved for station and yard tracks and private sidings.

The report has a number of appendices describing observations on track deflections, etc.

Signaling in the St. Louis Tunnel.*

The tunnel is the western approach to the railway or lower floor of the Eads bridge. Its western portal being at Clark avenue, it extends northwardly under Eighth street almost to Locust street, where it curves to the right and runs eastwardly under Washington avenue, from about Seventh street, to Main street, which is considered its eastern portal, a distance of seven-eighths of a mile.

When the Eads bridge and the tunnel were opened for traffic on July 4, 1874, the terminal facilities were inadequate and the first passenger trains commenced using the tunnel and bridge in June, 1875. Time-table No. 1 scheduled 52 in and out bound passenger trains for the nine roads entering St. Louis from the East at that time. To-day there are an average of 180 movements over the tunnel tracks in both directions every 24 hours. Of these 100 are regular passenger trains, 50 freight and 30 light engines.

The block system was used from the first, and in 1884 the Sykes lock and block apparatus was put in, making the co-operation of the levermen at both ends of tunnel necessary in order to display the proper signals permitting a train to enter at either end. A track circuit extended the entire length of the tunnel. Both tracks were equipped in the same manner and each could be operated as a single track. The plant included one of the first interlocking devices erected in this or any other country in which power other than manual was used to operate switches and signals from a central station. The failures were usually on the side of safety but resulted in annoying delays. Many changes and improvements were made in the apparatus under the direction of the writer's father, superintendent of structure at that time, the most important being the substitution of compressed air for hydraulic power.

In 1891 it became necessary to change the location of the tower at the west end of the tunnel and a new tower was erected with an entirely new machine, designed by the superintendent of structure and built in the shops of the company. In 1899 it was decided to adopt the present modern plant.

Mr. Wuerpel here described the Westinghouse Electro-Pneumatic apparatus as put in by the Union Switch & Signal Co. There are two interlocking machines, one of 27 levers, at the west end of tunnel ("X" office), and the other 11 levers, at the east end of the tunnel, near the west abutment of the bridge ("MS"). The two machines, which are 1.1 miles apart, are connected by electric locking which compels the co-operation of the levermen at both ends, before signals can be given to permit a train to enter the tunnel in either direction. Each track is signaled as a single track, which permits the indiscriminate use of either track in either direction with absolute safety.

Immediately over each track, at the west portal of tunnel are placed a high semaphore and a dwarf signal, which control east-bound movements into the tunnel.

The high signals are used for through movements only and are electrically locked by the mechanism at the east end. To clear a signal the concerted action of levermen at both ends of the tunnel is necessary. These high semaphores are automatically restored to stop position behind a train by means of the track circuit device. The track circuit, instead of extending the entire length of the tunnel, is divided into two short sections, each 240 ft. long, one section being at the west end and the other at the east end of the tunnel. Suitable relaying instruments being connected to these two sections, the same result is obtained as that produced by the continuous track circuit, that is, the signals, being automatically restored to the stop position, are held in that position and the controlling mechanism rendered ineffective until the train has passed entirely out of the tunnel.

On account of the proximity of the Tenth street freight yards it is frequently desired to allow a train to enter the tunnel a few car lengths in order to clear certain switches. The dwarf signals at this point, when indicating proceed, permit a train to enter the tunnel not to exceed 1,000 ft. The electric locking prevents the dwarf signals being cleared unless the entrance signals at the east end are at danger and the tunnel clear, likewise prevents the east entrance signals being cleared while the dwarf signals are in use.

Immediately outside the west portal of the tunnel are two dwarf signals, one for each track, which are operated [for west-bound trains] in connection with two other dwarf signals located within the tunnel 300 ft. from the entrance.

At a point between these exit signals, about 50 ft. in advance of the first, a torpedo machine is placed on each track, by means of which, when the entrance and exit signals are at danger, a torpedo is placed in such manner as to be exploded by the train or engine disobeying the signal. It may make the traveling public feel easier to know that it has never been necessary to explode a torpedo in order to stop a train, whose engineer disobeyed a tunnel entrance signal at danger. Occasionally, however, one is exploded by a train overrunning the first exit signal, it sometimes being impossible to see the signal by reason of smoke obscuring it. But this need not cause alarm, as the engineman has 300 ft. in which to stop his train—and he must make every effort to do so after exploding the torpedo—before arriving at the real danger point. Having stopped, the train is not allowed to proceed until a clearance card has been obtained from the despatcher at "X" office.

At the east end of the tunnel, the first signals encountered by a west-bound train are the dwarf signals located on the west span of the bridge near the west abutment. This signal is really a dwarf with the mast lengthened, in order to bring the blade and light high enough to be seen by approaching enginemen from the east, over the crown of the bridge floor. No high semaphores are used here on account of the whole plant being practically under roof, formed by the highway of the bridge. These dwarf signals protect the crossovers and control movements to the entrance signals, which are located on the short bridge spanning Main street. The tunnel entrance signals are also of the dwarf type, but carry no blades, the lights being kept burning at all times. They are equipped with small air whistles which give two short blasts automatically as the signals go to "proceed" position, to call the engineman's attention to the fact that the signal is clear. The entrance signals at the east end are, of course, controlled and locked in a similar manner to those at the west end of the tunnel.

The exit signals, together with the torpedo machines, are arranged precisely the same as the exit signals at the west end.

In addition to all the visible signals operated by these plants, audible signals in the form of air whistles electrically operated, are placed at various points to assist in conveying information to enginemen and trainmen—the more important of these being one located in the tunnel about 1,600 ft. from the west portal and one on the center span of the Eads bridge. They are used only to stop trains in cases of emergency.

Compressed air at 90 lbs. to the square inch, supplied from the compressing plant at the east abutment of

*From a paper by Mr. M. Wuerpel, Jr., Signal Engineer of the Terminal Railroad Association, read before the St. Louis Railway Club, Dec. 14.

the bridge, is conveyed in a 4-in. main extending across the bridge and through the tunnel. The electric current is furnished by a motor-generator plant (in duplicate) of about ¾ kw. capacity located in "X" office. The wire mains extend from "X" office, along the elevated structure on the levee [not through the tunnel] to "MS" to supply current at that point. This current is delivered from the generators at a voltage of about 20.

When a train enters the tunnel a disk indicator, conspicuously displayed in each office, turns to present its face, on which is lettered "Train on 71" (or 72 as the case may be—72 being the number used to designate the west-bound and 71 the east-bound track in the tunnel). These indicators, together with the noise made by a "buzzer," announce to the operators in both offices that the train is in the tunnel. At "MS" three operators are employed working in shifts of eight hours each. The services of three levermen in addition to the three despatchers are required at "X" office, a despatcher and a leverman being on duty eight hours. A chief despatcher working a "split trick" is also on duty at "X" four hours in the morning and a like number of hours in the evening. The maintenance of this plant is looked after by two repairmen working 12 hours each, whose duty it also is to inspect the apparatus at frequent intervals and to answer "trouble calls."

Foreign Railroad Notes.

The Southern Railroad of Argentina has decided to provide a pension fund for its employees. Those who have served 15 years with a satisfactory record, and who are 60 years of age, will be entitled to a pension equal to one-third the last salary received. No contribution is required from the employees.

The Spanish government is making requirements of the railroad companies, whose shares are largely owned in France, which these regard as oppressive; and it is intimated that the government wishes to force the companies to sell their privileges, in order that it may establish a state system. In the existing condition of the national credit, this seems almost impossible; and as Spain's civil service is almost as bad as ours, the management of a state system would seem quite impossible.

Train Accidents in the United States in December.

COLLISIONS.

Rear.

2nd, on Philadelphia & Reading, at Palmyra, Pa., a passenger train ran into the rear of a preceding freight; one trainman injured.

3rd, on Grand Trunk, at Gilead, Me., a freight train ran over a misplaced switch and into the rear of a preceding freight standing on a side-track. A drover was injured.

3rd, on Central of New Jersey, near Phillipsburg, N. J., a passenger train ran into a locomotive at the rear of a preceding freight train, wrecking the pushing engine and an empty passenger car at the front of the passenger train. The passenger engine fell down a bank and the engineman and fireman were killed. The passenger conductor was injured.

4th, on Great Northern, near Leavenworth, Wash., an empty engine ran into the rear of a preceding freight train, wrecking the caboose. The conductor was killed and two trainmen were injured.

5th, on Boston & Maine, near Petersburg Junction, N. Y., a freight train drawn by two engines broke in two between the first and second engine, and the forward engine was stopped so suddenly by the automatic brake that the rest of the train ran into it. A fireman was injured.

7th, on Boston & Maine, near Salisbury, Mass., an empty engine ran into the rear of a preceding freight; one brakeman killed and one fireman injured. The caboose and three cars took fire and were burned up. A third train ran into the wreck and was derailed.

11th, on Atchison, Topeka & Santa Fe, at Clare, Kan., a passenger train ran into the rear of a preceding freight, wrecking the caboose, which took fire and was burned up. A boy in the caboose was burned to death and six passengers and three trainmen were injured.

11th, on New York Central & Hudson River, near Newburg, N. Y., a passenger train ran over a misplaced switch and into some freight cars standing on the side-track, damaging the engine and two freight cars. One passenger was injured.

11th, on Baltimore & Ohio, near Opequon, W. Va., an empty engine ran into the rear of a freight train standing at a tank, wrecking the caboose. Two trainmen were injured, one of them fatally.

12th, on Pennsylvania road, at Olean, N. Y., a passenger train ran over a misplaced switch and into some freight cars standing on a side-track, badly damaging the engine. The fireman was killed and two trainmen and the engineman were injured, the latter fatally. A boy stealing a ride was fatally injured.

14th, about 6:30 a. m., on Pittsburgh, Ft. Wayne & Chicago, near Edgeworth, Pa., eastbound express train No. 8 ran into the rear of a preceding local passenger train, making a bad wreck. The rear car of the local train, which was empty, was split in two lengthwise and the other two cars in this train were badly damaged. The fireman of the express jumped off and was killed. Two passengers and three trainmen were injured. The block signal operator at Leetsdale, by momentary forgetfulness, gave a clear signal to the express train. He knew that the preceding train had not cleared the block section, and recalled the fact within a few seconds after the passage of the express, but not in season to prevent the collision. This man had been on duty about an hour-and-a-half.

15th, 11 p. m., on Pennsylvania road, near Kittanning Point, Pa., an empty engine ran into the rear car of a work train, containing a large number of men. This car was wrecked and at once took fire, and the occupants were got out with difficulty. One of them was burned to death and 13 were seriously injured. The empty engine had run past a block signal, set against it, at Kittanning Point.

17th, 2 a. m., on Grand Trunk, at Gorham, Me., a freight train standing at the station was run into at the rear by a following freight which approached at uncontrollable speed, and two engines and several cars were wrecked. One brakeman was killed.

20th, on Cleveland, Cincinnati, Chicago & St. Louis, at Cold Springs, Ohio, a passenger train ran into the rear of a preceding freight, wrecking the caboose and three freight cars. Two trainmen were injured.

21st, on Norfolk & Western, near Ivor, Va., a standing freight train was run into at the rear by a following freight; engineman and two other trainmen injured, the former fatally.

22nd, on Seaboard Air Line, at Cronly, N. C., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, doing slight damage. A brakeman standing in the caboose with his head thrust out of the door at the side was killed, the door being shut so violently as to break his neck. The conductor was injured.

23rd, 9 p. m., on Western Maryland, at Kemps, Md., a freight train broke in two on a descending grade and the rear portion afterward ran into the forward one, wrecking 15 cars. One brakeman was injured.

24th, 4 a. m., on Texas & Pacific, near Eastland, Tex., a freight train which had been unexpectedly stopped was run into at the rear by a following freight, and several cars were wrecked. Two employees were injured, one of them fatally.

25th, 7 p. m., on New York Central & Hudson River, near Geneva, N. Y., a passenger train ran into the rear of a preceding freight; one fireman killed.

And 24 others on 16 roads, involving 3 passenger and 40 freight and other trains.

Butting.

3rd, on Central of New Jersey, near Phillipsburg, N. J., butting collision between a passenger train and a freight; engineman killed and fireman injured. The freight train, eastbound, was, by special order, running on the west-bound track.

6th, on Houston & Texas Central, at Corsicana, Tex., butting collision between a passenger train and a switching engine, badly damaging both engines and several freight cars; two trainmen injured.

7th, on Louisville & Nashville, at Adger, Ala., butting collision of freight trains, badly damaging both engines and several cars; two trainmen injured.

7th, on Southern Pacific, near Peplin, Utah, a freight train drawn by two engines ran over a mispiaced switch and into the head of another freight, with two engines, standing on the side-track, badly damaging the four engines and several cars. A tramp was killed.

11th, 3 a. m., on St. Louis & San Francisco, at Greenland, Ark., a northbound freight train, running at full speed, ran over a switch and into the head of a train standing on a side-track, wrecking both engines and 20 cars. One fireman was injured. It is said that the switch lever was not misplaced, and that probably the leading wheels of the engine ran between the points.

11th, on Chicago & Alton, at Sag Bridge, Ill., butting collision between a passenger train, drawn by two engines, and a gravel train; four trainmen injured.

11th, on Southern Pacific, near Fenelon, Nev., butting collision of freight trains, on of them drawn by two engines. One brakeman was killed and five trainmen were injured.

12th, on St. Louis, Iron Mountain & Southern, at Des Arc, Mo., butting collision of freight trains; two trainmen killed and four injured.

23rd, on Norfolk & Western, at Ferrum, Va., butting collision of freight trains; four trainmen injured.

25th, 11 p. m., on Erie road, at Franklin, N. J., butting collision of passenger trains, damaging both engines. Two trainmen were seriously injured and several passengers slightly. The trains were to meet at this station, but there appears to have been a misunderstanding as to which should take the side-track.

And 4 others on 4 roads, involving 8 freight trains.

Crossing and Miscellaneous.

3rd, on Baltimore & Ohio, near Hyndman, Pa., a freight train which had become uncontrollable on a descending grade collided with four engines, making a bad wreck. A man in charge of a dead engine on the freight was injured.

4th, on Southern Pacific, near Suisun, Cal., a work train backed into a freight train, wrecking several cars. Ten employees were killed and 20 injured. There was a dense fog at the time.

5th, on Missouri, Kansas & Texas, at Gainesville, Tex., a freight tran ran over a mispiaced switch and into a switching engine standing on the side-track, damaging both engines; one engineman injured.

5th, on Boston & Albany, at West Brookfield, Mass., a through freight train backing into a side-track was run into by a local freight running in the same direction and several cars were wrecked, liberating two carloads of hogs. It is said that the flagman of the through train did not promptly signal the local; but the local had run past an automatic block signal set against it.

8th, on Illinois Central, near Way's Bluff, Miss., collision of freight trains; one fireman injured.

8th, 9 p. m., on Atlantic Coast Line, near Richmond, Va., a northbound freight train collided with a switching freight moving backward, and one engine and 12 freight cars were wrecked. One fireman was killed and the engineman and two brakemen were injured.

10th, on Baltimore & Ohio, near Rockwood, Pa., collision between a freight train and a work train, damaging both engines and several cars. Six employees were injured.

11th, at Troy, Ohio, a car which had broken away from a freight train of the Cincinnati, Hamilton & Dayton ran into passenger train No. 19 of the Cleveland, Cincinnati, Chicago & St. Louis, badly damaging two passenger cars. One passenger was injured.

11th, 9 p. m., at Galion, Ohio, a freight train of the Cleveland, Cincinnati, Chicago & St. Louis ran into an empty passenger train of the Erie road at the crossing of the two lines, wrecking one passenger car. It is said that the engineman received a signal from a switch tender and mistook it for one from the crossing watchman. The signal tower was knocked over and the signalman was injured.

14th, on Central of Georgia, at Macon, Ga., a freight train collided with some freight cars standing on a side-track; two workmen fatally injured.

14th, at Wallington, N. Y., a freight train of the Northern Central ran into a freight of the New York Central at the crossing of the two roads, damaging two cars. Two trainmen were injured.

15th, on Cleveland, Cincinnati, Chicago & St. Louis, near Fortville, Ind., a freight train backed into a passenger train, doing slight damage. The fireman of the passenger train was injured.

17th, near Toledo, Ohio, a passenger train of the Ann Arbor road ran into a freight of the Pere Marquette road; six trainmen and one passenger injured.

17th, on Delaware, Lackawanna & Western, at Dansville, N. Y., an eastbound freight train backing across the westbound track was run into by a westbound freight which had become uncontrollable on a steep grade, making a bad wreck. One engineman was killed.

20th, on St. Louis, Iron Mountain & Southern, at Piedmont, Mo., a freight train backing into a side-track collided with some standing freight cars, and two brakemen standing on the rear end of the caboose were killed.

23rd, on Chattanooga, Rome & Southern, near Rome, Ga., a passenger train ran over a misplaced switch and collided with some freight cars standing on the side-track. The engine was badly damaged and the fireman was injured. It is said that the switch had been purposely misplaced.

And 28 others on 22 roads, involving 7 passenger and 46 freight and other trains.

DERAILMENTS.

Defects of Roadway.

1st, on Atlantic Coast Line, near Wisacky, S. C., one passenger car and nine freight cars of a mixed train were derailed by a broken rail; one brakeman killed and two injured.

11th, 4 a. m., on St. Louis & San Francisco, near Fayetteville, Ark., a fast freight train was derailed at a switch by the breaking of a bolt in the switch connection, and the engine and several cars fell against a freight train standing on a side-track. Two engines were wrecked, one of them falling down a bank. One trainman and a man in charge of freight were injured.

15th, on Chicago, Burlington & Quincy, near Murray, Iowa, a freight train broke through a trestle bridge and the engine and 12 cars fell down a bank. Five trainmen were injured, three fatally.

20th, on Gulf & Ship Island, near Maxie, La., a freight train broke through a trestle bridge which had been weakened by a flood, and 10 loaded cars were wrecked. A brakeman was killed and one other trainman injured.

24th, 11 p. m., on New York Central & Hudson River, near Dover Plains, N. Y., a milk train broke through a bridge and several cars in the middle of the train fell to the stream below. The engine remained uninjured on one side of the stream and the caboose on the other.

And 4 others on 4 roads, involving 4 freight trains.

Defects of Equipment.

13th, on Great Northern, near Brockton, Mont., westbound passenger train No. 3 was derailed by the breaking of a truck, and four cars fell down a bank. Three passengers were killed and several injured.

20th, 3 a. m., on California Northwestern, at Miller, Cal., a freight train was derailed by the breaking of a truck and three cars were wrecked. Two trainmen were injured.

20th, on Erie road, near Horseheads, N. Y., a freight train was derailed by a broken axle and 10 cars were wrecked. A brakeman was injured.

20th, on Mobile & Ohio, near Crockett, Tenn., a freight train was derailed by the breaking of a truck, and five cars were ditched. A tramp was killed.

24th, on Chicago, Burlington & Quincy, near Kirkwood, Iowa, fast mail train No. 15 was derailed, presumably by the breaking of a wheel of the tender, and two mail cars were, with their contents, burned up. The fireman was killed and two other trainmen were injured.

30th, on Philadelphia & Reading, near Rosegarden, Pa., a car in a freight train was derailed by the breaking of an axle, and with two other cars, one loaded and one empty, fell down a bank. The derailed cars ran clear of the train so that the rear portion was automatically coupled to the front portion and the train proceeded as though nothing had occurred. The trainmen, however, saw the derailment.

And 8 others on 7 roads, involving 1 passenger train and 8 freight trains.

Negligence in Operating.

1st, on Boston & Maine, near Royalston, Mass., a westbound passenger train was derailed at a misplaced switch and the engine and three cars were overturned. Three trainmen were injurd.

1st, on York Southern, at Red Lion, Pa., part of a mixed train, five passenger and three freight cars, having been left unattended, ran uncontrolled to York, nine miles, when the cars were ditched. The only passenger on the train jumped off soon after it started.

8th, 11 p. m., on Northern Pacific, near Butte, Mont., eastbound passenger train No. 12 was derailed at a misplaced switch, and the engine fell down a bank. The first two cars were wrecked. Two men stealing a ride were killed and three trainmen were injured.

10th, on Grand Trunk, near West Paris, Me., a wrecking train passing through a bridge was wrecked by the boom of a derrick striking the bridge, and the engine and one car fell to the river below. The fireman was killed and the engineman was badly scalded. The bridge was wrecked.

14th, on Chicago & Alton, near Wesley City, Ill., a passenger train was derailed at a misplaced switch; engine wrecked and first two cars badly damaged. A mail clerk and the fireman were injured, the former fatally.

20th, on Baltimore & Ohio, at Weverton, Md., a freight train was derailed and the engine was overturned. The engineman was killed. It is said that the train ran into an open derailing switch, a signal having been disregarded.

And 9 others on 7 roads, involving 3 passenger and 6 freight and other trains.

Unforeseen Obstructions.

1st, 8 p. m., on Illinois Central, near Kankakee, Ill., a freight train was derailed at a misplaced switch and the engineman was injured. It is said that the switch was maliciously misplaced.

4th, on Norfolk & Western, near Mayodan, N. C., the engine and six cars of a freight train were derailed by a rock which had fallen on the track, and the wreck was partly submerged in a pond. A brakeman was killed and the fireman was injured.

23rd, 3 p. m., on Texas & Pacific, near Sulphur, Tex., a passenger train was derailed by running over a cow, and the engine was overturned. The fireman was killed and the engineman injured.

And 7 others on 7 roads, involving 7 freight trains.

Unexplained.

3rd, on Shelbyville, Bloomfield & Ohio, near Taylorsville, Ky., a mixed train was derailed and a brakeman was killed.

3rd, on Bellaire, Zanesville & Cincinnati, near Key, Ohio, a car in a freight train was derailed and, with another car and the caboose, fell down a bank. The conductor and two brakemen were injured, one of the brakemen fatally.

4th, 11 p. m., on Northern Pacific, at Rocker, Mont., eastbound passenger train No. 2 was derailed, and the engine and first three cars were ditched. Two tramps were killed and the engineman and fireman were injured.

8th, on Philadelphia, Wilmington & Baltimore, at Gray's Ferry, Philadelphia, a freight car, being switched on a side-track, was derailed and ran against the cars of a passenger train passing on the main track, damaging four of them, one badly. Twenty-two passengers were injured, one fatally, and several more were slightly hurt.

8th, on Houston East & West Texas, near Tenaha,

Tex., a freight train was derailed and seven loaded cars were ditched. One man was killed.

8th, 10 p. m., on Southern Railway, near Charleston, Tenn., two cars of a freight train were derailed. A short time afterward the engine of a freight (from the opposite direction) which was coming to the assistance of the disabled train, was run into at the rear by 30 cars of its own train, which had been left on a side-track, but which, it appears, had not been properly braked, and two engines and many cars were wrecked, blocking the line in a deep cut. One trainman and two tramps were killed.

11th, on Illinois Central, at Ilsley, Ky., one of the trucks of the tender of a passenger train was derailed, and after running some distance caused the derailment of the six cars next behind the tender. Two trainmen and six passengers were injured.

12th, on Pittsburgh, Cincinnati, Chicago & St. Louis, at Sturgeon, Pa., a passenger train was derailed and the engine was overturned. Several trainmen were injured.

17th, on Chesapeake & Ohio, near Eagle Rock, Va., a freight train was derailed and the engine was overturned. The engineman was killed and two other trainmen were injured.

19th, on the New York Central & Hudson River, near Trenton, N. Y., a freight train was derailed and nine cars were wrecked. A brakeman was injured.

23rd, on St. Louis Southwestern, near Pittsburg, Tex., a freight train was derailed on a bridge and several cars broke through; and, with the bridge, were wrecked.

30th, on Louisville, Henderson & St. Louis, near Henderson, Ky., passenger train No. 44 was derailed, and five passengers in the parlor car were seriously injured. The passengers in the coach, about 15 in number, were all somewhat injured. It is believed that the derailment was due to an obstruction which had been maliciously placed in a frog.

And 45 others on 36 roads, involving 3 passenger and 42 freight and other trains.

OTHER ACCIDENTS.

3rd, on Chicago & Northwestern, at Chicago, Ill., two cars in a passenger train were badly damaged by the explosion of a boiler in a power house near the terminal station, and several passengers were injured.

4th, on Baltimore & Ohio, near Elm Grove, Pa., the locomotive of a passenger train was enveloped in fire by passing through and igniting a large volume of natural gas escaping from a pipe beneath the track, and an explosion followed. The engineman and fireman were badly burned. The train was not stopped until the whole of it had passed through the fire. Some of the car windows were cracked.

7th, on Delaware, Lackawanna & Western, at Ray, N. Y., a locomotive was wrecked by the explosion of its boiler, and five employees were injured.

15th, on Lehigh Valley, at Cheektowaga, N. Y., the locomotive of a freight train was wrecked by the explosion of its boiler; the engineman and fireman were killed.

And 4 others on 4 roads, involving 4 passenger trains.

A summary will be found in another column.

The Preservation of Ties.

We have published at various times in the last three or four months Mr. Chanute's latest paper on preserving ties in Europe (Am. Soc. C. E. September *Proceedings*), and abstracts of the discussions thereon. Below is further discussion from the January number:

Ward Baldwin—Mr. Chanute's exhaustive résumé of the present practice in Europe in the preservation of ties suggests what is generally regarded as the next step in the evolution of track, namely, the use of metal ties. Statistics presented in the paper show that in Europe preserved ties can be procured at a cost which would apparently make them more economical than metal ties. The observation of the speaker, in passing over many miles of European roads laid with metal ties, is that the riding qualities of a track with metal ties are not superior to those of a track with wooden ties; and, therefore, the reason for their use would not appear to be that they give a smoother track.

Horace J. Howe—The author shows, among other things, how ties are seasoned before treatment in Europe, and emphasizes the necessity for so doing in any and all of the processes which he mentions. Possibly, seasoning for treatment is one thing and seasoning for direct track use is another. That is, the more the wood is made susceptible to the antiseptic, the better are the results, within certain limits; while the less alteration the surface undergoes, in the other case, the better will the tie stand the weather afterward.

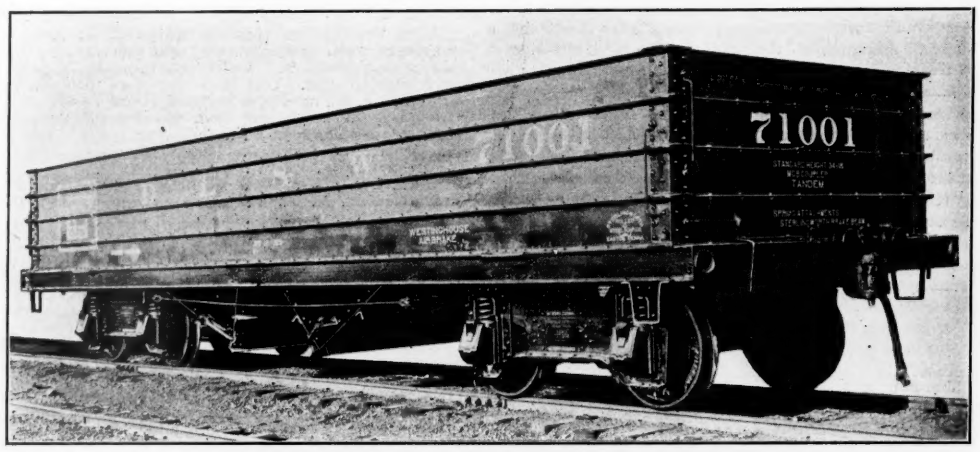
As to the saving by preserving ties, it is evident that everyone must calculate for himself. At present prices, the wolf does not seem to be at the door. Assuming that a raw tie will last nine years in first-class ballast (and no railroad hereabouts would consider seriously the treatment of ties unless its ballast was approximately first class), and that a treated tie will last 18 years, the following figures may serve as a basis for comparison:

One raw tie in place, 60 cents + 20 cents =	$0.80	
Interest at 4%, compounded annually for 18 years	0.82	
One raw tie in place, 60 cents + 20 cents =	0.80	
Interest for nine years	0.34	
Total cost to maintain one raw tie for 18 years		$2.76
One treated tie in place, 60 cents + 50 cents + 20 cents =	$1.30	
Interest at 4% for 18 years	1.34	
Total cost to maintain one treated tie for 18 years		2.64

Roughly speaking, the costs are the same. No allowance is made for tie-plates. The item for treatment (50 cents) includes extra freight on that account. If the foregoing does not focus with the facts, it is hoped that the author will indicate the reason.

Sterlingworth Rolled Steel Cars.

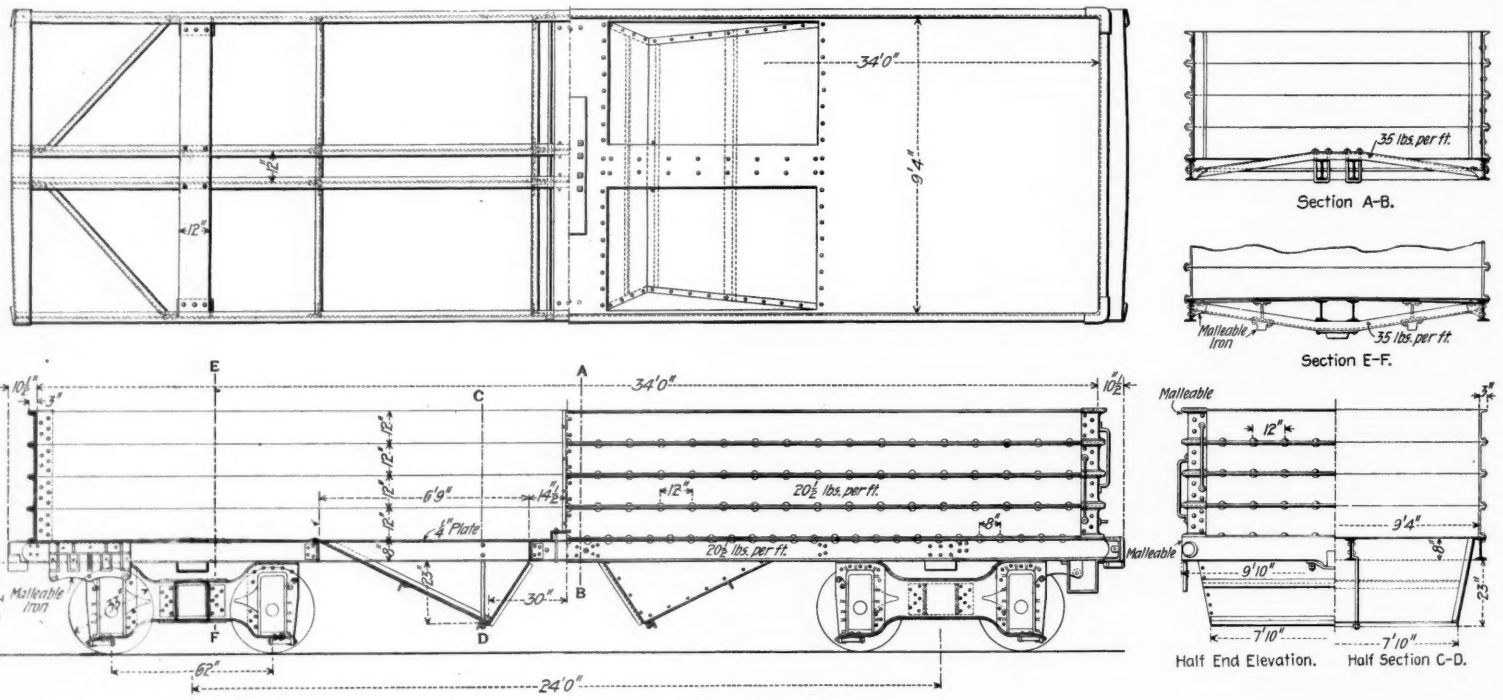
Ten double-hopper rolled steel coal cars were recently built for the Delaware, Lackawanna & Western, by the Sterlingworth Railway Supply Company. The light weight of these cars is 32,400 lbs., and their capacity 80,000 lbs. From the illustrations the general appearance and also the construction in detail are apparent. We illustrated, June 22, 1900, the first car of this kind that was built, and, as said at that time, the car was the subject of much favorable comment while exhibited at Saratoga during the conventions.



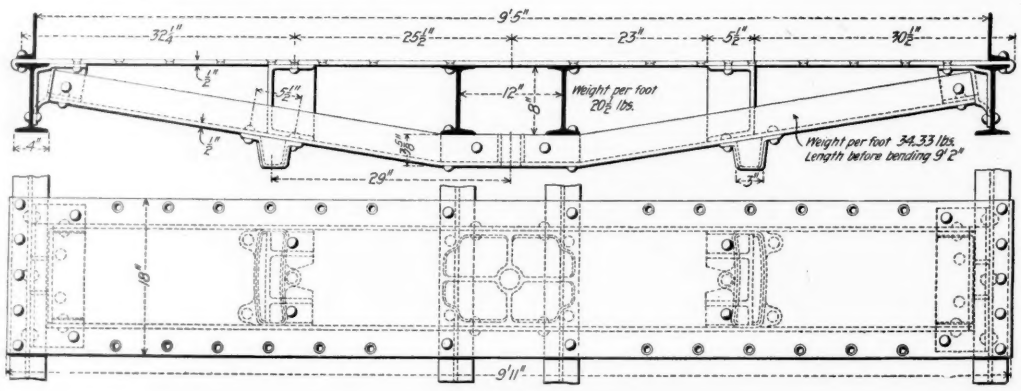
Sterlingworth Rolled Steel Car—Lackawanna Railroad.

The center sills are 8-in. I-beams, 20.5 lbs. per foot, spaced 12 in. between webs and braced by 8-in. channels 15.5 lbs. per foot. The cross sills are 8-in. channels, 15.5 lbs. per foot, secured to center and side sills by 5 in. x 5 in. x ⅜-in. angles 6 in. long. The end sills are malleable castings 9 ft. 11 in. long by 9 in. deep, containing pockets for the sills, which are inserted to a depth of 6 in. for the side sill and 7 in. for the center sill, re-inforced by intermediate ribs. The regular Gould 8-in. buffers, and McKeen draft gear with tandem springs are used. The Gould coupler, as specified by the railroad company, is used.

The body bolster is made of a 12-in. channel, 35 lbs. per foot, for the compression member, and a ½-in. x 18-in. steel plate for a tension member, with malleable fillers at center, ends, and over the side bearings. The truck is the Sterlingworth rolled steel pedestal type,



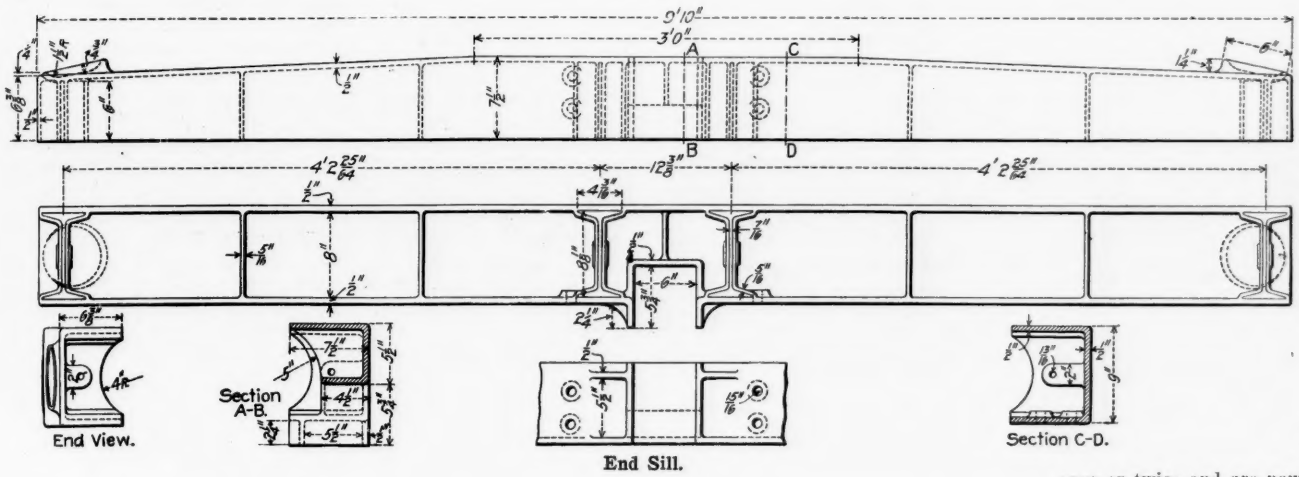
Plan Elevations and Sections of Car.

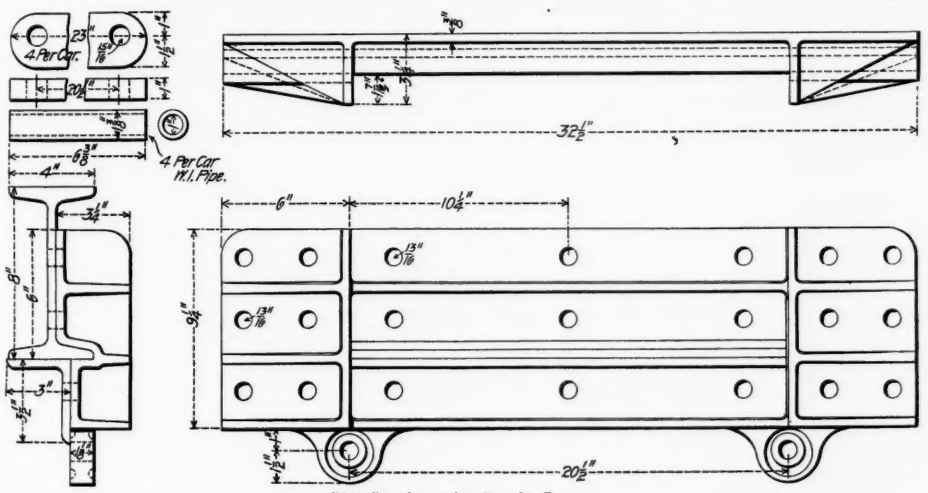


Body Bolster.

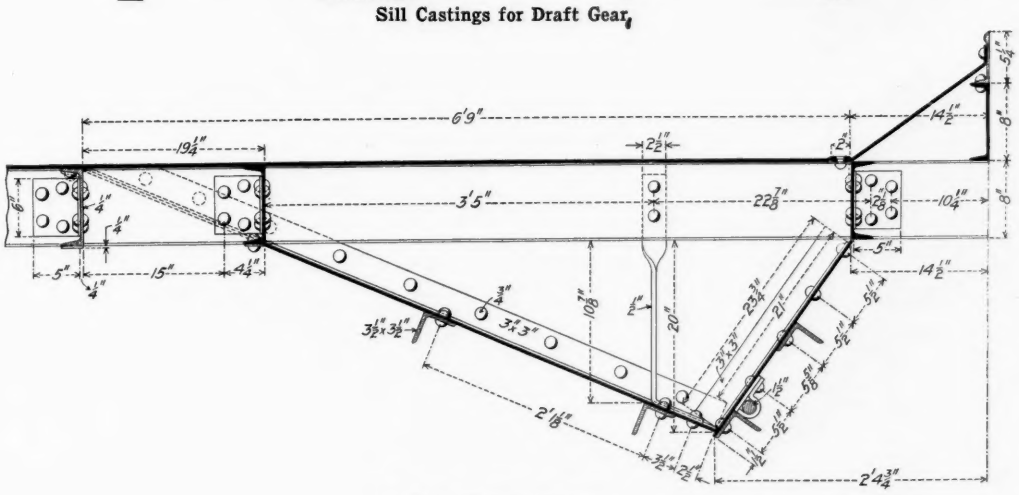
Joughins & Cliff patents, with McCord malleable journal boxes, pedestal jaws protected from wear by wearing strips, malleable iron center plates and side bearings. This truck was fully illustrated in the *Railroad Gazette*, March 31, 1899, p. 230.

The car sides and ends are of 12-in. channels, 15 lbs. per foot. The web is .23 in. thick, and the flanges, 2¾ in., are secured by ¾-in. rivets, spaced as shown in illustrations. The floor is ¼-in. sheet steel. The hoppers are ¼-in. steel with 3 in. x 3 in. x ⅜-in. angles at the corners, and 3 in. x 3 in. x 5-16-in. angles are used for stiffeners on the outside. The brake-beams are Sterlingworth. The wheels, axles, journal bearings and wedges conform to the M. C. B. dimensions. The pedestal springs are of special make, outer dimensions conforming to the M. C. B., but larger steel is used, viz., 1 7-16-in. outer coil; 1-in. inner coil, furnished by the National Spring Company and specified by Mr. L. T. Canfield, Master Car Builder of the Lackawanna.

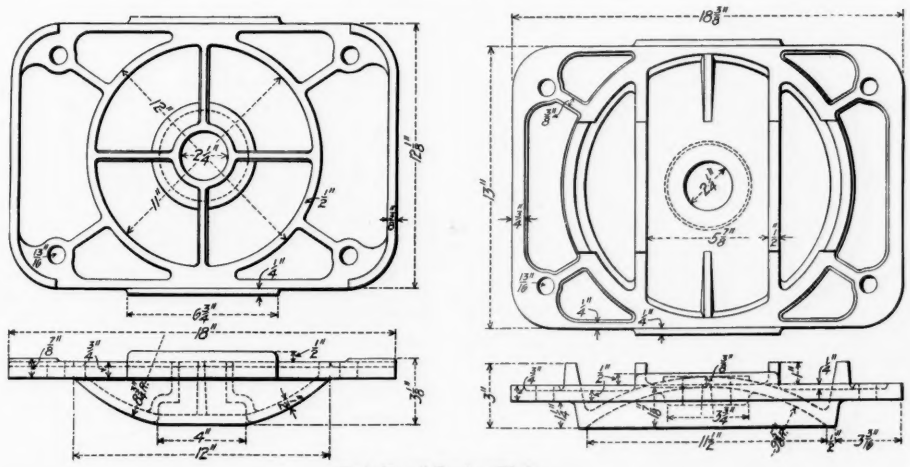




Sill Castings for Draft Gear.



Section Through Hopper.



Details of Center Plates.

New York State Canal Situation.

The New York State canal problem is proving exceedingly vexatious. It has been evident for some time that there is very far from unanimity of opinion in the state as to the proper course to be adopted. There are those who believe that the 9-ft. improvement of the present Erie Canal should be completed at an estimated cost of $16,000,000; those who believe that the Erie Canal should be enlarged to a 12-ft. barge canal at a cost of $62,000,000 more or less; those who believe that a ship canal constructed at an expense of $200,000,000, to be borne by the whole nation is the proper thing; and those who believe that the whole canal system is a mistake and should be got rid of at the earliest possible moment.

It has been expected that the present Legislature will take some definite action providing for submission to the people of some solution of the canal problem.

Just what belief prevails with the majority of the legislators assembled at Albany has not yet appeared, since the friends of the barge canal are awaiting the report of the State Engineer. During the past summer extensive surveys have been made to determine the cost of the proposed barge canal, and the State Engineer's report based on these surveys is promised early in February, when a message on the subject is expected from the Governor, and appropriate legislation will be undertaken. At present the friends of the barge canal are the most often seen and heard. They come mostly from Buffalo, which city believes that its salvation lies in transshipment of freight, and which, therefore, opposes everything in the nature of a ship canal.

The following bills pertaining to the state's canal policy have been already introduced, have been read once or twice and are now "in committee."

Senate bill No. 4, introduced by Senator Ambler, is a concurrent resolution introduced in the Assembly by Assemblyman S. W. Smith, as Assembly bill No. 7, providing for the amendment of the constitution by striking out section 8 of article 7. This section is that which prohibits the sale of the state canals. The resolution has been read twice in the Senate, once in the Assembly and referred in both houses to the Committee on the Judiciary. This amndment would merely remove the prohibition against the sale of the canals.

Mr. Hatch has introduced Assembly bill No. 50, which is a concurrent resolution, not yet recorded as introduced in the Senate, providing for the amendment of the same section 8 by substituting for the prohibitive language the following positive permissive language: "The Legislature may provide by law for the sale or other disposition of the Erie Canal, the Oswego Canal, the Champlain Canal, the Cayuga and Seneca Canal and the Black River Canal, and of all the right, easements, appurtenances and other property belonging to the state, connected with the use of such canals." This resolution has been read once, and referred to the Committee on Canals.

The last important act introduced is Assembly bill 240, presented by Mr. Remsen. This bill is designed to remove the limit placed upon the capital stock of canal transportation companies. The general corporation laws of 1890 provided for the formation of navigation companies, with a capitalization of not less than $20,000 or more than $4,000,000, to navigate the ocean, or any seas, sounds, lakes or rivers, and also provided that no railroad company should own, have or hold any stock in such navigation companies. Chapter 935 of the Laws of 1896 so amended the general corporation law as to extend the provisions to navigation companies operating on the canals, but changed the minimum capitalization to $5,000, and limited the capitalization of canal navigation companies to $50,000. The clause prohibiting railroad companies from owning stock in such corporations was retained. The bill of Mr. Remsen provides for the repeal of Chapter 935 of the Laws of 1896, which repeal would presumably leave the original general corporation law in effect. This bill has been read once and referred to the Committee on the Judiciary, where it now is.

The foregoing is the canal situation to date. The appearance of the State Engineer's report on the recent surveys will doubtless be the signal for renewed activity on the part of the friends of the barge canal, and further bills may then be looked for.

British and American Exports of Locomotives.

We give below a comparison of the values of exports of locomotives by years from the United States and from the United Kingdom. The figures cover 11 years to 1900, but the British year closes with Dec. 31, while our own is the fiscal year ended June 30. For convenience of comparison English pounds are reduced to dollars, at the rate of $4.87 to the pound.

	United States.	United Kingdom.
1890	$1,280,606	$8,995,540
1891	2,424,363	7,870,357
1892	1,717,715	4,787,429
1893	1,794,709	4,100,805
1894	1,028,336	3,647,860
1895	2,379,519	3,883,598
1896	2,512,270	5,245,226
1897	3,225,831	4,896,361
1898	3,883,719	7,219,939
1899	4,728,748	7,141,049
1900	5,592,403	7,304,174

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advetising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Railroad net earnings for November show results quite in accordance with the narrow margin of improvement in gross earnings for the month already noted in this column. The figures of *The Chronicle* for the month cover 133 roads, on which the gross earnings increased from $92,649,000 in 1899, to $95,690,000 in 1900, a gain of $3,041,000, or 3.28 per cent. The gain in net earnings for the month was 1.9 per cent., amounting to $649,000. The principal reasons for the falling off in gains were the failure of the spring wheat crop and the strike in the anthracite mines. The Pennsylvania Lines, covering those East and West, led in the increases in net earnings with $556,500. Other roads making large increases were the St. Louis Southwestern, $204,500; the Atchison, Topeka & Santa Fe, $166,800; the Baltimore & Ohio, $156,800; the St. Louis & San Francisco, $110,800, and the Choctaw, Oklahoma & Gulf, $102,700. The Chicago, Burlington & Quincy led in the decreases of net earnings for November, with $218,800; then follow the Canadian Pacific, $216,700; the Duluth & Iron Range, $186,800; the Northern Pacific, $111,000; the Minneapolis, St. Paul & Sault Ste. Marie, $107,800. The heaviest gains among the groups of roads were the 21 lines of the Southwestern, showing an increase in net earnings of $833,000, or 21.28 per cent. The 12 trunk lines gained $664,000 or 9.04 per cent. Three groups of roads show large losses in net. The heaviest was in the Northwestern group, 12 roads, which was $747,000 or 14.72 per cent. The Pacific coast lines, 13 roads, show comparative falling off in net of $408,000, or 5.45 per cent.; the five anthracite coal roads lost $31,000 or 1.53 per cent.

Facilities for "Finding" Stop Signals.

In a recent issue we discussed a rear collision near Offenbach, Germany, in which 12 persons were burned to death. We pointed out that one engineman was at fault for backing into a block section which he had just vacated, while the other was at fault for running past a stop signal. But the reader will have observed that both of these enginemen ran past the block signal, although we did not emphasize the point in summing up the case. Both enginemen took chances. Germany, supposed to have the best trained soldiers in the world, and requiring all her young men to serve for a time in the army, has cases of railroad discipline no better than one finds on small roads in new countries. It must be that there are not enough good disciplinarians to go round, and that the army gets all the best ones, leaving the poorest for the railroad department.

However, we do not bring up this question here for the purpose of comparing different grades of discipline, but to suggest a means of getting along better with all kinds of discipline. In this country, as well as in Germany, examples of poor discipline (or poor men), are always easy enough to be found, as may be seen from remarks occasionally made in the Railway Signaling Club and elsewhere about enginemen who "lose their bearings" and fail to observe a signal until they pass it. Mr. Elliott has told of an engineman, who, with a fast train, ran upon a signal when he thought that he was still two miles short of it! This is not impossible on the western plains; though in more diversified surroundings a runner who should lose himself one-quarter as badly as that would be considered grossly negligent. A point to be remembered is that in most cases of this kind the engineman probably has neglected to avail himself of all the means at his command for keeping informed as to his whereabouts; the trouble was not wholly due to the sameness of the landscape but partly to a poor look-out. And, finally, a runner thus caught usually has to acknowledge that he ought to have more carefully heeded the rule to slacken speed when in doubt as to his whereabouts.

The remedy is to provide more or better artificial landmarks. In the German cases there were evidently none of these whatever. In the case cited by Mr. Elliott there may or may not have been a "mile-board" or something of the kind, but the question is not important, because it is admitted that even where such marks are provided they are not always of suitable size or suitably placed to be of service at night when there is a fog or the locomotive headlight does not burn brightly.

Assuming that the expense of providing and maintaining a distant signal cannot be borne, the simple and necessary expedient is a post, board or other device which will surely be visible to the fastest-running engineman, under the most adverse circumstances. If necessary, a high white fence could be built along close to the track, beginning a mile before reaching the signal. If a mile is not necessary perhaps a half mile or quarter mile, or an eighth, will be useful. We do not assert the absolute need at any particular place of any fence whatever, or of any artificial landmark; but we do say that if a runner has any good excuse for not being able readily to keep track of his whereabouts he ought to be provided with all necessary aids to enable him to do so. If the intention is to get along with deficient landmarks by having speed slackened whenever the view is shortened by fog, that intention ought to be definitely set forth, and low speed enforced. It is to be observed that mishaps of the kind under discussion are usually reported as occurring to fast trains, which indicates that trying to make faster time than the facilities of the road provide for is perhaps the underlying cause of most of the accidents.

In providing a landmark the essential point is to have some object, in full view of enginemen, and not more than 10 ft. from the track, fixed at a known distance from the signal for which it is an indicator. It should be easily describable, so that in discussions as to whether it was or was not seen on any given occasion, there may be no quibbling. The value of a fence over a post is that it relieves the engineman from too much anxious watching. A fence 100 ft. long, very close to the track, is a great relief, in a fog, as compared with a single post. The distance of a fence from the signal could be indicated by the height of its posts or by the number of its boards. Such a fence would keep out cattle as well as would a right-of-way fence, though of course none but a very poor road would try to make it take the place of a fence on the boundary line.

Of course the best "mile-board" or single-post signal is a semaphore, with an arm fastened horizontal (if nothing better can be afforded), and with a lamp to be kept lighted at night. This is a true distant signal, though it promotes safety only, not speed. But in view of the demand which on some roads is felt, more or less, all the time, for audible fog signals, and the very short view that an engineman has of a semaphore when running fast in a fog, the idea of a white fence is not unworthy of notice even when a distant signal is provided. It might afford the simplest means of meeting the difficulty which arises where a distant signal is not far enough back for the fastest trains. In most cases this difficulty is felt only in stormy or foggy weather, because in clear weather the engineman can see the distant signal from afar; but whenever or wherever the difficulty does appear, a second distant signal is needed. As only one road that we have heard of (the Pennsylvania) has introduced these double cautionary signals, we judge that most managers feel reluctant to adopt such an innovation. If it is not adopted the only rational alternative is to give up the high speed. A landmark a mile or half mile back of the distant signal does not, indeed, enable the fast runner to see the signal any sooner, but it does enable him to measure the distance accurately and to avoid reducing his speed any more than is actually necessary. Is not this an advantage worth having?

If one really desires to have his fast trains make their time in all weathers this matter of accuracy in measuring the distances needs attention at all fixed signals. A superintendent determined to have the fewest possible signals on his road could find some little landmark almost anywhere, on the most monotonous prairie, and could thus with some plausibility require his enginemen to shirk for themselves; but the theory of the fewest possible signals has little to commend it. A rational theory requires that the enginemen of all trains, slow or fast, shall have the best possible means, when approaching a stop signal—as nearly uniform as possible at all places on a railroad or a division—for learning just where to reduce speed with the least loss of time. And to secure the desired uniformity, almost anything in the shape of semaphores, boards, posts, fences or lamps is far better than any number of natural landmarks, such as red houses, trees, rocks or woodchuck holes.

Locomotive Rating.

Mr. Thomas Tait's paper on rating freight engines, presented before the New York Railroad Club and published at considerable length in our issue of Jan. 18, is one of the best papers on the subject that has yet appeared. The method described and recently adopted by the Canadian Pacific, is not altogether new; at least, the fundamental principles of Mr. Tait's system of rating are the same as used by the Northern Pacific and described by Mr. E. H. McHenry, in our issue of June 25, 1897, as Mr. Tait himself points out. That, however, is in its favor. Few roads had studied the whole question of engine loading and train resistance in quite so rational and practical a manner as the Northern Pacific. It follows that other roads upon investigation might well reach similar conclusions in the matter of engine rating and adopt methods similar to the Northern Pacific's. We will not now attempt to review at length Mr. Tait's paper but will only refer to a few points which may serve to give a general idea of his method and draw attention again to the article printed last week.

The Canadian Pacific was one of the first roads to adopt the tonnage basis for rating and loading its freight engines; using the actual tons except in the case of empty freight cars, to the weight of which an arbitrary addition was made. This, it may be said, is the common practice to-day on roads which are using a tonnage system, and it becomes a matter of a good deal of importance to know that the Canadian Pacific's experience under the "actual" tonnage system was not wholly satisfactory. It was shown, especially since cars of large capacity have come into use, that the hauling capacity of engines should be based on a uniform proportion of tare weight to gross weight behind the tender, and that in loading engines the resistance of every train should be determined as compared with that of a train having this uniform proportion of tare. After an investigation, the Canadian Pacific decided to adopt one-third as the uniform proportion of tare weight to gross weight behind the tender; that is two of contents to one of tare by weight. The new schedules of hauling capacity of locomotives in freight train service therefore show the number of tons which each class of engine can take from station to station, in each direction, in a train the tare weight of which is one-third the gross weight behind the tender. One class of engines is taken as a standard and then others are classified in accordance with their relative hauling capacities. Each class is designated by the percentage of its capacity, taking the standard engine as a base. The data concerning hauling capacity and train resistance of different divisions was got by dynamometer car trials. Allowances for fast and slow speeds, kinds of weather and conditions of rail are provided for in the usual way by varying the schedule ratings by suitable percentages. All of this is explained very clearly by Mr. Tait and one of the great merits of his paper, as of his system, is its simplicity; it is understandable by anyone who will read it, and it is short.

It will be noted that the schedules for the different divisions show the ratings of different engines when hauling a standard train, the weight of which is one-third tare and two-thirds contents, and to facilitate the work of making up trains of loaded, partially loaded and empty cars, a chart is issued which was reproduced with our abstract. Up to this point the Canadian Pacific method, at least in principle, is essentially the same as that devised by Mr. McHenry for the Northern Pacific, excepting in the latter case a diagram for equating the tonnage of partially loaded

and empty cars is used instead of the chart. The diagram answers the same purpose but possibly the chart is more readily understood by men unfamiliar with graphical representations. Both chart and diagram are based on the assumption that the resistance of empty cars is 30 per cent. greater than the same weight of loaded cars.

The advantage of this method of rating and loading engines is that each engine is given its approximately correct load having regard to the proportion of tare to gross weight. The Canadian Pacific uses this "equivalent" ton-mileage for statistics as giving fairer comparisons of fuel and other performance of engines and men. However, the chief benefit derived from this system, as Mr. Tait says, is to be found in the fact that advantage is taken of every opportunity, through larger capacity cars or better loading, to increase the tonnage of freight trains.

Of course it would be a mistake to suppose that this method of rating is final or complete, or applicable to all conditions. That it is not so considered, Mr. Tait was careful to point out in his discussion at the club meeting. For instance, that percentage of the total train resistance which is due to rolling friction, journal friction, etc., would be smaller as the grades become heavier. Thus the assumption that empty cars require 30 per cent. more power to haul than the same tonnage in loaded cars is only correct in certain cases. As said, the author of the paper fully recognizes these things. But at the same time, the best that can be done in rating engines is to make a reasonable approximation to scientific accuracy.

We advise all those interested in locomotive rating to secure a copy of this paper when it is finally published in the Club Proceedings, as there are several blanks and forms that we could not reproduce but which will be useful to anyone in adopting the system.

December Accidents.

Our record of train accidents in December, given in this number, includes 101 collisions, 105 derailments and eight other accidents, a total of 214 accidents, in which 66 persons were killed and 199 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

Collisions—	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	9	0	1	10
Misplaced switch	3	1	3	7
Failure to give or observe signal	6	0	2	8
Mistake in giving or understanding orders	0	1	0	1
Miscellaneous	8	1	16	25
Unexplained	18	10	22	50
Total	44	13	44	101

Derailments.

Broken rail	2	Bad switching	2
Loose or spread rail	1	Bad loading	1
Defective bridge	4	Runaway	3
Defective switch	2	Failure to give signal	1
Broken wheel	4	Animals on track	4
Broken axle	6	Landslide	3
Broken truck	3	Ice	1
Brake hose burst	1	Malicious obstruction	3
Misplaced switch	5	Unexplained	58
Track repairers	1	Total	105
Derailing switch	1		
Careless running	1		

Other Accidents.

Boiler explosion	2	
Broken side-rod	2	
Cars burned while running	2	
Other causes	2	8
Total number of accidents		214

A general classification shows:

	Collisions.	Derailments.	Other accid't's.	Total.	P. C.
Defects of road	0	9	0	9	4
Defects of equipment	10	14	4	28	13
Negligence in operating	41	15	2	58	27
Unforeseen obstructions	0	11	2	13	6
Unexplained	50	56	0	106	50
Total	101	105	8	214	100

The casualties may be divided as follows:

Killed—	Collisions.	Derailments.	Other accid't's.	Total.
Employees	34	15	2	51
Passengers	1	4	0	5
Others	2	8	0	10
Total	37	27	2	66
Injured:				
Employees	89	34	7	130
Passengers	28	36	5	69
Others	0	0	0	0
Total	117	70	12	199

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	0	1	5	6
Defects of equipment	3	3	3	10
Negligence in operating	1	28	37	97
Unforeseen obstructions and maliciousness	0	10	2	5
Unexplained	1	27	4	12
Total	5	69	51	130

Forty-two accidents caused the death of one or more persons each, and 34 caused injury but not death, leaving 138 (64 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with December of the previous five years shows:

	1900.	1899.	1898.	1897.	1896.	1895.
Collisions	101	127	106	107	29	72
Derailments	105	105	107	95	60	79
Other accidents	8	4	7	6	6	6
Total accidents	214	236	220	208	95	157
Employees killed	51	46	25	18	43	41
Others killed	15	19	7	10	19	7
Employees injured	130	98	127	135	53	84
Others injured	69	73	56	60	37	115
Average per day:						
Accidents	6.90	7.61	7.10	6.71	3.06	5.06
Killed	2.13	2.10	1.33	0.90	2.00	1.55
Injured	6.42	5.51	5.90	6.29	2.90	6.42
Average per accident:						
Killed	0.31	0.28	0.15	0.13	0.65	0.31
Injured	0.93	0.72	0.88	0.94	0.95	1.27

The most fatal train accident of the month was the collision at Suisun, Cal., on the 4th, in which a work train was wrecked and nine employees were killed. The explosion at Chicago, reported the same day, was notable as a train accident, but the wreck of the building resulted in the death of six persons and the fatal injury of several others. The newspapers of that day reported a third serious accident, that near Phillipsburg, N. J. This collision was a fortunate one as regards injuries to persons, though a passenger car was wrecked. As in many other accidents during the month, a large part of the destruction here was caused by fire. One of the worst accidents of the month, as measured by the number of passengers injured, was that at Gray's Ferry, Pa., on the 8th, which was due to an insignificant derailment of a freight car, the cause of which could not be discovered.

Two collisions in the present list occurred on lines worked by the block system. At Edheworth, Pa., on the 14th, a signalman made an unaccountable mistake and a passenger car was wrecked, but, fortunately, it was nearly or quite empty. At Kittanning Point, Pa., on the 15th, a somewhat similar collision wrecked a car filled with laborers; in this case the fault is attributed to the engineman.

The wreck of a passenger train on the Mexican National was reported Dec. 23, in which 20 passengers were injured.

The number of electric car accidents in the United States in December, as reported in the newspapers, aggregates 17, in which 12 persons were killed and 90 injured. One of these accidents, at Providence, R. I., on the 3rd, was the derailment of the rear truck of the rear car of a four-car train, at a facing point switch. The train was one of the Providence, Warren & Bristol line of the New York, New Haven & Hartford, but it was running on one of the streets of the city at the time. Another accident, in which three persons were injured, was a disarrangement of the electrical connections in the car, the personal injuries being caused by electric shocks.

Railroad and Commercial Telegraphy.

Most of the telegraph offices in this country do not take in enough money to pay the operator's wages. Indeed, a great number of offices, perhaps a majority, take in for commercial telegraph business less than a hundred dollars a year. If such offices are to be kept open, of course the operators must do something else to live. Sometimes they sell cigars, or periodicals or drugs; sometimes they help about a hotel; but usually they work for a railroad. So we are quite accustomed in small places to go to the railroad station for our telegrams just as we do for our express parcels. Indeed, we feel aggrieved, if, in the country, we cannot send or receive a telegram at the railroad station. "Why is not the agent an operator?" we say.

It is very natural that the railroads should have drifted into the position of handling the local business of the telegraph companies. On the one hand the railroads had lines of telegraph with stations situated as near as possible to centers of population, and at each station an operator who would probably not be bothered with a few commercial messages. Why not sell a few minutes of his day to a telegraph company? Anything the railroad received, in commissions, or free telegraphy, or in poles or wires was all profit. On the other hand the telegraph company could not maintain offices of itself in all these places, so why not let the railroad take a part of the earnings at such points? The rest could be treated as clear gain. Such an alliance was all the more attractive to the telegraph companies because the railroads had rights of way, available for telegraph as well as for railroad purposes, direct rights of way that the railroad was bound to maintain against all comers. It was worth something to a telegraph company to be assured such a right of way, for lines of poles along the highways are a prey to borough and village authorities, and can only be policed in a buggy. Again, if the railroads assume all the local work the telegraph company is relieved of all minor trouble connected with the operations of local telegraph lines with their endless variety of "calls" and inconveniences surpassing even those of telephone party lines.

With both sides eager to make a bargain it is only natural that for the last 40 years or so the telegraph companies have been making with the railroads contracts varying greatly in their details, but all agreeing in this that the telegraph companies retained for themselves the lucrative business handled on through wires between large centers, while the railroads for a consideration undertook the sparse business between local points.

The main difference then between railroad and commercial telegraphy is that most of the railroad work is on local wires and most of the telegraph companies' work is on through wires. Comparatively few of the railroads have any large number of through wires, and fewer yet use any of the various multiplex machines.

With the telegraph companies most of the circuits are through ones, with few offices, and the use of the duplex and quadruplex is frequent. The Western Union, indeed, goes farther than that, and has followed the British Post Office in its use of the Wheatstone "rapid" apparatus, in which the dots and dashes are punched in a tape which can be run through the transmitter with great speed, sending hundreds of words in a minute.

This difference in work makes a difference in men. The typical railroad telegrapher is the man who can promptly identify and report a train and can handle a train order quickly and correctly; a man who can be trusted to flag a train or to act in an emergency. The typical commercial telegrapher is the one who can sit all day long at a "heavy" circuit, working with one other office, or two at most, sending or receiving hour after hour at a steady gait, work which would break down his more volatile railroad brother. Or else he is the expert, learned in the balancing of quads or the elimination of "bugs."

But to return to our bargain. It was a good one pretty much everywhere, up to a recent date. It is still a good arrangement where railroad work does not take up all the railroad operator's time. But with the increasing density of traffic on some of our railroads and with the advent of block signals, the railroad operators are being separated from the station force and from the public. They are being hidden away in towers or at strategic points far away from the stations. Furthermore, these operators have more and more tracks, trains and signals to watch. The time is coming, if it has not already come, when they cannot safely be expected to handle commercial telegraph business.

This state of things is coming, of course, only on the main lines of our greatest railroads. On the branches and smaller lines the old contracts fit and the agents and operators can still handle this outside telegraph work. But on certain main lines the question of a change is already presenting itself. In such a situation is the railroad bound to supply two sets of operators, one in the towers, to run the road, and another in the stations to handle the agent's telegrams and the commercial business? Or should the telegraph company go back to the country stores with its offices? Or should the telephone enter the scene at this point? The question is an interesting one and we may expect to see many solutions tried in the next few years if the business of the railroads continues to increase.

Once on a time, a certain railroad president, on receiving an exchange annual stamped "Not good on the Limited," returned the favor with a pass "Good only on the Local Freight." The reader is, no doubt, familiar with this story; and as it is now several years old, and rather tame, we will tell another. It comes from the peaceful city of Springfield, Ill., though the state of mind of some of the participants in the events to be narrated is far from peaceful. According to a press despatch the Chicago & Alton has been distributing to members of the Illinois Legislature passes marked "Not good in compartment cars," "Not good on Alton limited," "Not good locally between Chicago and Joliet"; and, of course, the legislators do not like it. Representative Nohe at once introduced a resolution calling for the appointment of a committee to investigate all wrecks on the Chicago & Alton within the last six months. In the Senate it was proposed to investigate the assessment of the road by the State Board of Equalization, it being asserted that the company is escaping its just share of taxation. If nothing of a mollifying nature comes in to change the situation, further news may be expected next week. In Indiana there is trouble of a still more grievous nature. It is not, perhaps, so injurious to the members' dignity, but it is much more sudden and painful in its practical effect. According to the Indianapolis *Sentinel*, the members of the General Assembly have not yet received passes from any railroad except the Pennsylvania. "Several days before the session convened each member received a pass from the Pennsylvania which is good only for transportation in this state. These passes are not transferable and are not good longer than ten days after the close of the session. Inasmuch as many of the members cannot reach their homes by way of the Pennsylvania lines there is considerable uneasiness over the action (?) of the other systems. Heretofore, the Big Four, Vandalia, Monon, and, in fact, all the roads have furnished the members of the General Assembly with passes. The reason given why they have not done so this year is that there is no important railroad legislation to come before the Assembly. The failure of the railroads to furnish the members with passes and the trouble over the appropriation bill made it rather difficult for some of the members to spend Sunday at home. At the last moment there was considerable hustling on the part of some of the members to find others who were willing to institute a loan office for their benefit."

The funny thing about the Indianapolis item is the reporter's innocent explanation of the dearth of passes. The members have not yet "struck" the railroads. But withholding the passes is the very best thing that the railroads could do to stir up the legislators to renewed activity in devising what they call railroad legislation—bills to reduce the income or increase the expenses of

the railroads—so it is difficult to see how the reporter's explanation can be accepted. In Illinois, as we see, a very little drying up on the part of a railroad starts two moves against the road at once. The proposition to investigate the accidents of the past six months is, we take it, merely a feeler; if the required concessions are not forthcoming an investigation covering six years should be ordered. But the Illinois statesmen seem to be wealthy and independent. Their plan of campaign would never work in Indiana. What does an accident inquiry amount to on Saturday afternoon when you cannot get home? It is not a legal tender at hotels or lodging house. The other Illinois scheme—to increase the taxes—would be much better adapted to the wants of Indianapolis. A State Board of Equalization, however, is a clumsy instrumentality. It is intolerably slow. The method recently employed by the tax collector at Brazil with the Chicago & South Eastern is much more practical. If the Sergeant-at-Arms of the House had chained down a few locomotives on that eventful Saturday afternoon, a suitable levy could have been arranged in short order, and the legislators would have been saved the mortification of borrowing from their fellow-members.

Representative Henry C. Smith, of Michigan, has introduced in Congress a bill to create a "national freight association," to fix and regulate freight rates throughout the United States. Mr. Smith proposes to have this commission consist of 12 members, six of whom shall be railroad men and six representatives of shippers or mercantile interests. The twelve commissioners are to be selected partly on a territorial basis, and the bill prescribes the boundaries of the Eastern, Western, Southern and other divisions. The bill is a long one, with clauses describing in detail the duties of the commission in connection with uniform classification and other things. Whether or not there is a single useful line in the bill we have been unable to determine. The projects for new legislation in the various state Legislatures now in session embrace the usual bewildering variety of measures, good, indifferent and bad, mostly the latter. Among those which seem likely to elicit at least a little useful discussion are: One in Wisconsin to establish a board of three railroad commissioners, under a law similar to that now in force in Minnesota; one in Minnesota to increase the state tax on railroads, making it 4 per cent. on gross earnings; and one in North Carolina to change the "Jim Crow car" law. In New York State a dozen or more bills have been introduced regulating various details of operation and of fares on steam and electric roads in and around New York city.

The New York Central has won its suit, begun last November, to get a reduction of $8,271 in the taxes assessed by the State of New York on its gross earnings. The company's claim was based on the fact that the tax law cannot be equitably applied to the money earned by the road in carrying the United States mails, because the mails which are intra-state cannot be separated from those which are interstate. The law imposing a tax of one-half of 1 per cent. on gross earnings applies only to receipts accruing from transportation which begins and ends within the state. The decision is by Justice Smith, of the Third Appellate Division of the Supreme Court. In view of the impossibility of distinguishing one class of mail from another, it is held that the Comptroller was not authorized to use any portion of the mail earnings as a basis for ascertaining the tax. The receipts of the Central for carrying mails during the year ending June 30, 1899, aggregated $1,654,182.

Pooling Locomotives.

Concerning this Mr. Quereau has lately said that the chief advantages are:

a. A greater mileage per engine, hence a smaller capital invested in motive power.

b. More uniform and sufficient rest for the enginemen.

I believe there are the following advantages in pooling during the dull as well as the busy season:

1. The use of the engine best adapted to the business offered, without running the men around one another;

2. The rigid inspection obtained by the use of special inspectors;

3. The men are not required to work on their engines between trips;

4. Laying up engines in good order during the dull season;

5. The men lose no time, because their engine is held out of service for repairs;

6. A large number of men can be kept in service and training during the dull season, because the pay is uniformly distributed, and during the rush the number of men can be regulated so as to secure proper rest for all;

7. More thorough running repairs, because the enginemen are losing nothing while the repairs are being made.

I am impressed that there is another important consideration for continuing the pool during the dull season, after using it while business is heavy. It requires considerable time in which to get all concerned accustomed to the working of a properly organized pool, and for the system to be brought to its most efficient perfection. It will probably take from two to three years to secure the best results. If the plan of handling the power is changed from pooling to assignment once in six months and back again at the expiration of the same period, I very much doubt if the pooling system can be worked to its greatest advantage. Certainly few would advise changing the shop organization once in six months. I believe the proper time to organize a pool is during the dull season, so that it may become properly systematized while there is time to give its workings careful attention and will be running smoothly when the tug of war comes, on much the same principle that football players and prize fighters go into training for the final struggle which is to test their skill and ability.

Fast Trains in Europe.

Recent improvements in the speed of express trains in England, Scotland and France form the subject of an article by Mr. Rous-Marten in *The Engineer* for Jan. 11. In 1899 Mr. Rous-Marten found numerous improvements to report, but in 1900 there were not many, and a considerable portion of the present article is devoted to refutations of erroneous statements which have been made by other writers. France still shows faster schedules than England. The French did not make much improvement in 1900 over 1899, but the very natural explanation is that the 1899 record was remarkably high. In France, speeds on the different lines are limited by statute, the highest limit being 74.4 miles an hour. On some parts of the Paris, Lyons & Mediterranean the limit is 68.3, and on other sections of this and other roads the limits are 62.1 and 55.9.

There are eight stretches of railroad in France, of over 100 miles each, which are traversed regularly by trains which make no stops. The longest of these is from Paris to Arras, on the Northern, 120 miles, at 55.3 miles an hour. On most of these eight lines more than one non-stopping journey is made daily. Between Paris and Troyes, 103.75 miles, there are six such trips daily, the fastest being made at 49 miles an hour. This is on the Eastern Railroad.

In England there are so many long runs without a stop that the author tabulates only those of 120 miles or longer. Of these he finds 18. The longest is from Paddington (London) to Exeter over the Great Western, 193⅝ miles; quickest time 3 hours 43 minutes, rate 52.1 miles an hour. Between Crewe and Carlisle, over the Northwestern, 141⅛ miles, 10 trips are made daily, each without a stop, the fastest being at the rate of 51.6 miles an hour. The total number of runs without stops shown in this table of routes is 56.

Mr. Rous-Marten gives tables showing the fastest run on each of the principal British roads and a similar table for the French; and also shows all of the runs in each country scheduled at 54 miles an hour or faster. Of these he finds in England 17 and in France 36. The best in the British list is from Forfar to Perth, on the Caledonian, 32½ miles, in 33 minutes (59 miles an hour). The best French run is on the Midi between Morcenx and Bordeaux Contrôle, 67¾ miles in 66 minutes (61.6 miles an hour). On the Northern from Paris to Amiens, 81¾ miles, one train is run in 81 minutes (60.5 miles an hour).

NEW PUBLICATIONS.

Engineering Studies, Part II; Roman Stone Arches. By Charles Evan Fowler, M. Am. Soc. C. E. Pamphlet, 16 pages. New York: Engineering News Publishing Co. 1900.

In this little pamphlet Mr. Fowler has gathered photographs of the most celebrated Roman bridges and aqueducts, and he has given a short description of each. We have no doubt that many engineers and others will like to add this pamphlet to their collections because it assembles pictures and information which few people have the opportunity to collect. Eight different structures are shown.

The Engineering Magazine for January is a "works management number" and has an important and interesting table of contents and list of writers. One group of short articles deals with the Elswick Works, the Carnegie and Krupp Works, and has a sketch of Mr. George Westinghouse. Mr. Schwab writes of the Carnegie Works and Mr. McFarland of Mr. Westinghouse. One article by two different writers is on the "Uses and Abuses of Organization," another is on "Intensified Production and Its Influence on the Worker," and another on "Intensified Piece Rate System in Practice." Other articles deal with the premium plan, with advanced foundry practice, with cost keeping, with shop arrangement and electric drive in engineering works, etc. Mr. Canniff has an article on "The Discipline and Control of Railroad Employees." The editor has gathered a group of short papers on the strength and weakness of the combination or trust idea, giving expressions of opinion by Messrs. John D. Rockefeller, Andrew Carnegie, James B. Dill and the late Baron Russell, Lord Chief Justice of England.

Discharge of Sewage Into Boston Harbor.—The State Board of Health of Massachusetts has recently published a report on the discharge of sewage into Boston Harbor, the body of the report being by Mr. X. H. Goodnough, Chief Engineer. One of the outlets, namely, that near Deer Island, discharges continuously regardless of the stage of the tide, but this is so situated that no nuisance is created. Another outlet, near Moon Island, discharges intermittently according to the tide, and a considerable nuisance is created here by the return of sewage along inhabited shores. It is proposed to establish two other outlets further out in the bay to remedy this situation. The report is a thorough discussion of present and future conditions.

Rolling Lift Bridges.—The Scherzer Rolling Lift Bridge Co. has just issued a handsome volume illustrating and describing especially the Scherzer rolling lift bridge, but incidentally a number of other lifting bridges. The volume is 13½ x 10½ in. (the shape of the page being designed especially to display the numerous plates), has 68 pages with many cuts and plates in the text, also 23 direct reproductions from photographs of examples of Scherzer bridges. Mr. William Scherzer, the inventor of the bridge which now bears his name, was born in 1858 and died in 1893, and this volume is prepared by his brother, Mr. Albert H. Scherzer, President of the company. The famous bascule bridge in London, known as the Tower bridge, is shown and described, as are a few other developments of the pivot or trunnion bascule bridge, and comparisons are made between these and the Scherzer type. Some comparison is also made of the weights, dimensions and other elements of swing bridges. A number of ideal pictures are given of ornamental Scherzer bridges designed especially for architectural effect. The general engineering features of the Scherzer bridge are then described and special descriptions are given of a number of actual examples. There are essays on the internal harbor system of Chicago and on the development of water transportation in the United States. Altogether the volume is a useful compilation and it may be had from the company, Monadnock Block, Chicago. The price is $10.

TRADE CATALOGUES.

Draft Without a Chimney is the title of a little book, of which the fourth edition has just been issued by the B. F. Sturtevant Co., Boston, Mass. This brings the total number of copies printed up to 50,000. It relates to the experience of the Sturtevant Co. in the use of a fan to produce draft without a chimney in its own works. Copies will be furnished on application.

Gas and Gasoline Engines.—The Charter Gas Engine Co., 9-11 Wallace street, Sterling, Ill., in its "New Century" catalogue, shows an adaptation of its work to hoisting, pumping, traction and belt driving. The catalogue is illustrated and contains tables of dimensions and capacities, and testimonials.

Pipe Unions, Flanges and Cocks.—The E. M. Dart Mfg. Co., Providence, R. I., have issued a small catalogue for 1901, listing and illustrating their patent lubricating, stop and waste cocks, steam cocks, the Dart union with bronze ball joint, flanges and other pipe fittings, and a number of other specialties which they make.

Railroad Publications.—Mr. Edward Baker, 14 and 16 John Bright street, Birmingham, England, sends a special catalogue containing 1,610 titles, being a Lot of documents, charts and books concerning railroads, which he offers for £250. Duplicates of some of these items may be had, the prices to be fixed by correspondence. This special catalogue contains a valuable list of titles of material concerning 13 different English railroads. Mr. Baker publishes a handbook of 224 pages, sold at two shillings, which gives an annotated list of his stock.

The Boston Belting Co., Boston, Mass., has just issued a little 12-page pamphlet descriptive of rubber mats, matting and treads for railroads and steamships. It contains illustrations and prices of the materials named.

Hand Cars, Etc.—The Kalamazoo Railway Supply Co., of Kalamazoo, Mich., sends catalogue No. 12, being a pamphlet of 112 pages, describing hand cars, inspection cars, track jacks, benders and drills, barrows and trucks and various other specialties.

Air Compressors.—The Clayton Air Compressor Works, 26 Cortlandt street, New York, have just issued a catalogue that illustrates and describes the many types of Clayton air compressors, air receivers, vacuum pumps, carbonic acid gas and high pressure compressors and the Clayton air-lift pumping system. It also contains full information about the transmission of compressed air, and capacity lost by air compressors in operation at various altitudes. It is one of the most complete works of its kind published. Copies will be sent on application.

Steel Tubes.—The Shelby Steel Tube Co., Cleveland, Ohio, have ready for distribution a new price list of hot-rolled or cold-drawn steel tubing, safe ends, seamless cold-drawn square tubing, and tubing of various other kinds for mechanical use aside from boiler work. Prices and weights per foot for given gage are tabulated.

The Born-Dunham Car Improvement Co., Old Colony Building, Chicago, has issued a pamphlet describing a new journal box, lid and dust guard. The most essential claim made is that a dust-proof journal box is the result of this combination. The lid is flat and hung from the top. When closed the lid is forced against the box by a lever pivoted near the center of the lid. The lever can be wedged beneath projections on the box at either side of the

lid so as to force the lid inward against its seat. A lock is provided for holding the lever in place, when the lid is down.

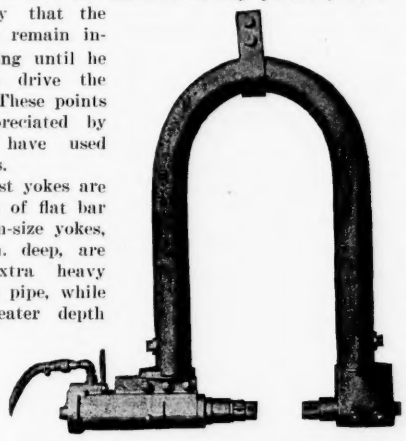
Drills.—We are in receipt of a new catalogue of the Bickford Drill & Tool Co., Cincinnati, Ohio, a pamphlet of 66 pages with half-tone engravings of various kinds of drills. On the page opposite the engraving are a brief description and the principal dimensions of the tool. There are shown different styles of radial drills, post and wall drills, suspension drills, multiple drills and traveling drills. Beside these, drills for special purposes are made.

The Empire Manufacturing Co., Denver, Colo., sends a pamphlet describing its mechanical boiler cleaner. This consists of a surface skimmer in the boiler from which a pipe runs to a settling tank outside the boiler. There is also a return pipe from the settling pipe to the boiler so that a water circulation is maintained. The idea is that impurities lodge in the settling tank, from which they are readily blown out.

Steel Tubes.—In a small pamphlet the Seamless Steel Tube Co., Detroit, Mich., announces that its new plant at that place is completed and it is in position to furnish steel tubes ranging from 1 to 3½ in. in outside diameter.

Pneumatic Yoke Riveter—Philadelphia Pneumatic Tool Company.

The pneumatic riveting machine here illustrated is adapted to a wide range of work on tanks, stacks, bridges, ship framing and structural work. It will drive rivets of any size up to 1⅛ in. and the depth of the yoke may be from 10 in. to 10 ft. or more. It is an improved design. It is positive in its action, no dependence being placed on springs or other similar devices. The entire action of the machine is under the control of the operator by means of one throttle lever. The first movement of the lever causes the hammer cylinder to move out against the rivet, and the next movement starts the hammer to work. When the rivet head is finished a reverse movement of the lever causes the hammer to stop working and the cylinder to withdraw into the casing by air pressure. The advantage of this arrangement is that the cylinder may be moved out until the button set comes in contact with the hot rivet, and held there while any necessary adjustments are made before starting the hammer to work. This will, in many cases, prevent spoiling the rivet and cutting it out. The withdrawal of the cylinder into its casing by means of air pressure enables the operator to use the machine in any position, with the certainty that the cylinder will remain inside the casing until he is ready to drive the next rivet. These points will be appreciated by those who have used yoke riveters.



The smallest yokes are usually made of flat bar iron. Medium-size yokes, up to 48 in. deep, are made of extra heavy wrought iron pipe, while those of greater depth are made of steel plates braced and stiffened with angle iron.

The machine is light in weight and simple in construction, having but three moving parts. With each machine are furnished two riveter dies and one holding-on die, with necessary collars for adjusting the gap for different length of rivets. The machine requires 25 cu. ft. of free air a minute, and ample facilities are provided for thoroughly oiling all parts. On field work, erecting large water, gas, and oil tanks, 80 to 100 rivets per hour have been driven.

The Nicaragua Canal.

Mr. Paul Morton, of the Santa Fe, lately said of the Nicaragua Canal: "The Nicaragua Canal will undoubtedly be built, and it will probably cost upward of $300,000,000. This will be $4 per capita for every man, woman and child in the United States. It may in time prove to be of great benefit to the people living along the Atlantic and Pacific coasts. As surely as it helps the cities along the sea coast, just as surely will it damage cities in the interior of the country. A large share of the business now done by Chicago, St. Louis and other important inland cities with the Pacific coast will be transferred to the merchants and manufacturers located on the Atlantic coast. All will pay the taxes, a few will get the benefits, and many jobbers and manufacturers and other citizens of the interior will be damaged. There is no doubt that New Orleans and other gulf cities will grow on account of the canal, but it will be at the expense of Chicago, St. Louis, Kansas City and other similar markets.

"If I was a member of Congress from the great manufacturing section of the Mississippi Valley I would study the question of supporting the canal bill very carefully before committing myself to the proposition. It is bound to destroy the opportunity the Middle West now enjoys to compete with the industries of the East for the Pacific coast trade. Take away the distribution facilities and you kill the production.

"I can readily understand why the Pacific coast wants the canal built, and it is perfectly plain why the Atlantic seaboard shipper wants it constructed, but I submit that the middle and western states will not profit thereby, and that in case the canal is to be put through some way should be devised for exempting from taxation on its account all those who live between the Allegheny and the Rocky mountains and north of the Mason and Dixon line. It will be punishment enough for that portion of the population of the United States to be deprived of a trade advantage that they now enjoy on the Pacific coast without paying a large part of what it costs to take away the advantage.

"The people of the Pacific coast think they are going to be benefited by the construction of the canal. There is little doubt about this, although the merchants and manufacturers at San Francisco and Puget Sound points must not forget that it will be just as far from the Pacific coast to Yokohama and Hong Kong after the canal is finished as it is now, and much less distance from New York, and that the moment the canal is open and ready for business, rates from the Atlantic seaboard to points in the Orient will be greatly reduced and at times will be as low from New York as they will be from San Francisco. This will prevent the Pacific coast from doing the business in the Orient that it aspires to do.

"It seems to me that the Nicaragua Canal bill should be entitled: 'An act to build up and foster the commerce of the cities along the Atlantic seacoast and the Gulf of Mexico.' These places are certainly going to be the chief beneficiaries, although foreign shipowners—over 75 per cent. of all the business that will pass through the canal estimated as being in foreign bottoms—will come in for a very large benefit from the construction of the canal by American capital."

TECHNICAL.

Manufacturing and Business.

Taylor Best Yorkshire iron axles will be used by the Pittsburgh Locomotive Works on the 45 engines to be built by them for the Illinois Central R. R. Co.

The Sterlingworth Co. of Easton, Pa., has closed a contract with the Northern Pacific for 17,000 brake-beams for the 4,250 cars recently ordered by that road.

The Ashton Valve Co., of Boston, Mass., has appointed Sidney A. Stephens, 22 St. John street, Montreal, Canada, as agent for its pop safety valves and steam gages throughout the Dominion of Canada.

On Friday of last week and on Sunday and Monday of this week passenger trains were badly delayed by snowdrifts in Maryland. From Bruceville, Md., drifts of 7 ft. in depth were reported as very common.

The Chesapeake & Western Co. has been incorporated in Virginia to build tunnels, bridges, etc. The capital is $50,000. The officers are all of New York, as follows: President, Edgar Madden; Vice-President, B. Elden Wilcox; Secretary, John C. Ward, and Treasurer, William H. Hall.

Mr. H. M. Perry, at one time with the Pullman Co., and later with the Madison Car Co., has opened an office as Consulting Engineer at 1023 Monadnock Building, Chicago. He will make a specialty of inspection, estimates and appraisals of all classes of new and second-hand cars and railroad specialties.

The Industrial Water Purifier Co., Chicago, announces that it has changed its corporate name to the Kennicott Water Softener Co. This action is deemed advisable on account of confusion resulting from another water purifier company having a very similar name. The agent for the Kennicott Co. for railroads is the J. S. Toppan Co., 77 Jackson Boulevard, Chicago.

The Case Mfg. Co., Columbus, Ohio, report the recent following orders: For span cranes of from two to 75 tons capacity, from the St. Louis Transit Co.; St. Lawrence Construction Co., Massena, N. Y.; F. Hammer Paint Co., St. Louis, Mo.; Canton Roll & Machine Co., Canton, Ohio; Niles Iron & Sheet Co., Niles, Ohio; Chicago & Alton R. R., Bloomington, Ill.; National Gear Wheel & Foundry Co., Allegheny, Pa., and National Tube Co., McKeesport, Pa.; for trolleys of from 12 tons to 40 tons capacity from the Rarig Engineering Co., Columbus, Ohio; Pittsburgh Steel Foundry, Pittsburgh, Pa.; Totten & Hogg Iron & Steel Foundry, Pittsburgh, Pa.; Scullin-Gallagher Iron & Steel Co., St. Louis and the Otis Elevator Co., Chicago, and for jib cranes of from two tons to 12 tons capacity from Gerst Bros. Mfg. Co., St. Louis, Mo.; Humphreys Mfg. Co., Mansfield, Ohio; Abendroth Bros., Port Chester, N. Y.; Pittsburgh, Cincinnati, Chicago & St. Louis (Dennison shops); New Jersey Foundry & Machine Co., Passaic, N. J., and the American Rolling Mill Co., Middletown, Ohio.

Iron and Steel.

The office of Vice-President, heretofore held by Colonel A. M. Shook, of the Tennessee Coal, Iron & Railroad Co., has been abolished.

The Newport News Ship Building & Dry Dock Co. has contracted with the Navy Department for one sheathed armored cruiser of 14,500 tons, to cost $3,885,000, and for a similar cruiser, unsheathed, to cost $3,775,000.

The Paterson Iron & Steel Forge Co. has been incorporated in New Jersey, with a capital of $128,000, by James D. Shields, Horace G. Cooke, John W. Ferguson, Paterson, N. J.; Eugene Stevenson, attorney, Paterson, N. J.

The Illinois Bridge & Dredge Co. has been incorporated under the laws of Illinois to make and sell highway bridges. I. W. Osborne is President and Manager, and R. H. McWilliams, Secretary and Treasurer. The office is at Mattoon, Ill.

Bids are being opened Feb. 1 at the Navy Department for three protected cruisers, to be the largest unarmored ships in the U. S. Navy and about 3,000 tons heavier than the Olympia. About nine builders are expected to bid on the ships.

Bridge Contracts—New York Central.

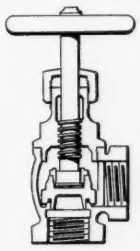
Bids will be received by W. J. Wilgus, Chief Engineer, New York Central & Hudson River Railroad, for 28,000 tons of new bridges, and the contracts are to be awarded in February. The material is all steel, and the spans are to be New York Central standard types; plate girders for less than 100 ft.; riveted lattice trusses for 100 ft. to 200 ft.; and pin-connected trusses for those over 200 ft. The work includes the renewals of bridges between Weehawken and Ravena; between Buffalo and Suspension bridge; Beech Creek Railroad and Fall Brook Railroad.

Electric Traction on the Metropolitan of London.

The experiments on the Metropolitan were so far successful that no difficulty was encountered in arriving at the decision that it would be both practicable and economical to work the whole network of lines of the Metropolitan and Metropolitan District by electricity. Tenders were invited at the end of last year for the requisite plant. In response nine tenders have been sent in. It appears that the offer of Ganz & Co., of Budapest, was so much below the others, and so full of novelties, that the directors of the two companies have asked Sir W. H. Preece and Mr. Parker to go to Budapest to investigate the proposed system. They will probably be accompanied by a director from each Board.

An Improved Blow-Off Valve.

The accompanying illustration shows a new design of blow-off valve made by the Crane Co., of Chicago. This valve was designed to overcome trouble frequently experienced in valves used for this purpose. It will be noticed that in this valve the seat is on the outside; this prevents sediment from lodging on it. The projection on the under side of the disc prevents any discharge taking place until the seats become widely separated. This prevents wire drawing and prolongs the life of the valve seats. These valves are made in either angle or globe pattern.



The Memorial Bridge at Washington.

On Jan. 16 and 17 the Senate Committee on the District of Columbia gave a hearing on the subject of the Memorial bridge to discuss the advisability of substituting the Keller plans for the Burr plans. Brig.-Gen. Wilson and Col. Allen, of the Engineer Corps of the Army, and Prof. Burr, Mr. Morrison and Mr. Keller were heard.

Electrifying the London Underground.

We have mentioned at other times and places the fact that Messrs. Ganz & Co., of Budapest, are so far the lowest bidders for the electric work of the Metropolitan and Metropolitan District railroads of London, and that a special committee has been sent to Budapest to look into their methods and apparatus. A correspondent of the London *Telegraph*, writing from Vienna, has given some account of the Ganz system. They transmit current at 20,000 volts and use it at a working pressure of from 3,000 to 5,000 volts. They use the three-phase alternating current. The working current is taken off the wires by a trolley and the high pressure conductors are entirely inaccessible. Special attention is paid to the signal system. The volume of current is relatively small and it is feasible to use the same current for signaling as for running. This system was first installed in Italy on the line from Lecco to Lake Como, where a three-phase current of 20,000 volts is transmitted to 10 converter stations, where the voltage is reduced to 3,000. The passenger motor cars have each four three-phase motors of 150 h. p. These cars weigh 50 tons and carry 60 persons, and each motor car also hauls four trailers. Freight motor cars are used, each equipped with four motors, and these are capable of hauling 250 tons at 18 miles an hour. The passenger cars are expected to reach a speed of 36 miles an hour on the level.

Material Required for Electric Railroads.

Below is a list, compiled from the *Street Railway Journal*, of electric railroads which contemplate building additional track in the spring and summer and buy additional equipment:

Milford, Holliston & Framingham Street Ry., Milford, Mass., 13 miles, including turnouts.

Jackson & Suburban Traction, Jackson, Mich., 75 miles.

Pennsylvania & Ohio, Ashtabula, Ohio, 13 miles, for which 60-lb. T rails are wanted.

Findlay Street Ry., Findlay, Ohio, 7 miles, for which 60-lb. T rails will be used.

Omaha & Council Bluffs Railway & Bridge Company,

Omaha, Neb., will, during the next three months, rebuild 3 miles to 5 miles of track and place new frogs and switches over the entire system.

San Francisco & San Mateo Electric Ry., San Francisco, Cal., 22 miles of single track road.

Valdosta Street Ry., Valdosta, Ga., 2 miles.

Oswego Traction, Oswego, N. Y., about 4½ miles.

Florence Street Ry., Florence, Colo., 20 miles of double track road to be laid with 60-lb. rails.

Seattle-Tacoma Electric Ry., Tacoma, Wash., about 40 miles of double track.

Concord & Clinton St. Ry., Concord, Mass., about 15 miles to be laid with 70-lb. T rails.

Mountain Lake Electric R. R., Gloversville, N. Y., about 4½ miles of single track.

Millville Traction, Millville, N. J., 8 miles single track.

Butler Passenger Railway, Butler, Pa. This company plans to build six miles of track.

St. Louis & Suburban, St. Louis, Mo., 30 miles to be laid with 95-lb. girder rails, 60 ft. long.

Bangor-Hampden & Winterport Ry., Bangor, Me., 10 miles double track.

Akron & Cuyahoga Falls Rapid Transit, Akron, Ohio, 8 miles.

Los Angeles & Pasadena Electric, Pasadena, Cal., about 12 miles.

Erie Electric Motor Co., Erie, Pa., 4-mile extension is proposed during next two months.

Wichita Railroad & Light Company, Wichita, Kan., contracts will be placed within 30 days for 5 miles of track.

Liberty & Jeffersonville Electric R. R., Liberty, N. Y., 16 miles to be laid with 60-lb. T rails, on single track.

Pittsfield Electric Street R. R., Pittsfield, Mass., 12 miles, 60-lb. T rails, and 2½ miles heavy girder rail.

Memphis Street Ry., Memphis, Tenn., 5 miles.

St. Thomas Street Ry., St. Thomas, Ont., rails are wanted for an 8-mile extension.

Troy & New England Ry., Troy, N. Y., rails are wanted for 5 miles of extension.

Oskaloosa St. Ry. & Land Co., Oskaloosa, Iowa, contracts will soon be placed for between 6 and 15 miles of 45-lb. T rails.

Indianapolis & Martinsville Traction, contracts will be placed within two months for rails for 31 miles of road.

Stroudsburg Passenger Railway, Stroudsburg, Pa., will extend its lines about 1½ miles and build a new power plant.

East Side Electric Railway, Kansas City, Mo., will extend 4 miles during the next three months, and build an additional car house.

Baltimore & Washington Transit Co., Washington, D. C., proposes to build 4 miles, and is contemplating building 28 miles of double track.

Alton Railway, Gas & Electric Co., Alton, Ill., contemplates extending to East Alton, Godfrey and Bethalto.

La Crosse City Railway Co., La Crosse, Wis., will build one-half mile during the year.

Negaunee & Ishpenning Street Ry. & Electric Co., Ishpenning, Mich., will build one mile of track, and has under consideration 5 miles of new line.

Grienville Light & Car Co., Grienville, Miss., expects to build 1½ miles during the next six months.

Augusta Railway & Electric Co., Augusta, Ga., will build 12 miles of track, with heavy rails.

Sioux City Traction Co., Sioux City, Ia., will build, within three months, a new car house.

The Astoria Railway, Astoria, Ore., will build 2 miles and a new power station.

Lancaster Traction Co., Lancaster, Ohio, will build about one-half mile, extending the Main street line, and rebuild about the same amount of track with new rail.

El Paso & Juarez Avenue Street Ry. Co., El Paso, Tex., is considering changing into an electric line.

City Street Ry. Co., Fremont, Neb., will build 10 miles and a power house.

People's Electric Ry., Sandusky, Ohio, has consolidated with the Sandusky, Milan & Norwalk Railway Co., and proposes to rebuild from Sandusky to Norwalk.

Temple Street Cable Ry., Los Angeles, Cal., contemplates changing 3 miles of cable road to electricity.

Newton Street Ry., Boston, Mass., is considering the building of a power station in Waltham.

Washington, Arlington & Falls Church Ry. Co., of Alexandria, Va., expects to build one mile.

Halifax Electric Tramway, Halifax, N. S., will build 2 miles.

Shreveport Belt Ry., Shreveport, La., will replace a mile of 45-lb. girder rail with 70-lb. T rail.

Buffalo, Hamburg & Aurora Ry., Buffalo, N. Y., will build 7 miles of road.

Meriden, Southington & Compunce Tramway Co., Meriden, Conn., will build 28 miles. A new car house will be built, and an extension will be built to the power house.

Fonda, Johnstown & Gloversville R. R., Gloversville, N. Y., will extend about 4 miles, and build a power plant.

Atlanta Rapid Transit, Atlanta, Ga., will build 14 miles and an addition to car house.

Sarnia Street Ry., Ltd., Sarnia, Ont., will place contracts during the next three months for 3 miles of road, rails and other equipment.

Worcester & Blackstone Valley Street Ry., Worcester, Mass., is in the market for equipment of a power plant.

Union Electric Co., Dubuque, Ia., expects to place contracts for considerable reconstruction work in 6 months.

Carbon County Electric, Mauch Chunk, Pa., will build 13 miles and a car house.

Oakwood Street Ry., Dayton, Ohio, contemplates building about 1½ miles of new line.

Urbana, Mechanicsburg & Columbus Electric Ry., Columbus, Ohio, expects to place contracts in six months for 58 miles of track, new car house, power stations, etc.

Metropolitan West Side Elevated, Chicago, Ill., will build 2½ miles of extensions, and will require additional equipments.

Keokuk Electric Railway, Keokuk, Iowa, will need material of all kinds, and will commence work on rebuilding early in the spring.

New Brooklyn Freight Yards of the Long Island.

The Long Island Railroad has bought several blocks of land for a freight yard in eastern Brooklyn. The plot extends from a point just south of East New York, along the west side of the New York & Manhattan Beach line for several blocks to a point near where the Rockaway branch joins the Manhattan Beach line. It is proposed to make this yard a distributing point principally for coal and lumber. Cars will be landed from the Upper Bay at the Sixty-fifth street station, Brooklyn, on the New York & Manhattan Beach, from which there is a direct line to the new yard. The yard is not far from the Flatbush avenue station, which, if present plans go through, will be the terminus of the Long Island's tunnel line from Manhattan Island. Bushwick station, which is also not far away, is to be the terminus of the New York Connecting line now building to connect the Long Island road with the New York Central & Hudson River. Plans are being prepared for work on the yards, but building will not be begun until spring opens.

Blinders on Automatic Signals.

The shields on the back side of automatic disk signals on the Worcester Division of the New York, New Haven Hartford are being abandoned. All of the signals on this division (about 40 miles) are being replaced by another design of disk signal and frame, which has no shield; and it appears that the advantage derived from the shields, which have been in use about six months, is not deemed sufficient to warrant changing the construction of the new signals so as to continue them. It is said that the enginemen looked upon the shields as a convenience, when running in the opposite direction at night, as in some cases they would hide a light which otherwise might be mistaken for a signal governing the track on which the engineman was running; but this convenience is not of sufficient consequence to be classed as a necessity.

Pennsylvania Steel Company.

An officer of the Pennsylvania Steel Co. says that a majority of the shareholders have assented to the plan for the formation of a new company. The property owned by the Pennsylvania Steel and the Maryland Steel companies will be taken over by a new company to be called the Pennsylvania Steel Co., incorporated under the laws of New Jersey, with a capital stock of $25,000,000, in 7 per cent. non-cumulative preferred shares, and $25,000,000 common stock. It is proposed to issue $16,500,000 preferred and $10,750,000 common stock, for which the plants at Steelton and at Sparrows Point will be transferred to the new company, subject to the existing bonded debt. Shareholders have until March 15 to file consent, and their stock with the Girard Trust Co., trustee.

New York Central Contracts.

The New York Central & Hudson River Railroad has just let a number of large contracts. The contract for the engine house work at West Albany is let to W. J. Gillett of Syracuse, N. Y. The work includes two 30-stall engine houses with turn-table pits, office building, shop building, water and steam piping, and a two-track 25 pocket coal trestle, the work to be completed July 15, 1901. This contract, together with additional work not yet awarded, will aggregate in cost $220,000.

The company has also just awarded a contract to Burke Brothers of Scranton, Pa., for the grading and masonry work for the double track on the Pennsylvania Division, between Jersey Shore and Newberry Junction, Pa. A contract for over one mile of bulkheads and three large piers on the Hudson River at Weehawken, N. J., have been let to Henry Steers, Jr., of New York city.

The contract for the Syracuse coaling plant contract has not yet been let.

Southern Car & Foundry Company.

The general offices of the Southern Car & Foundry Co. have been moved from Gadsden, Ala., to Birmingham. The headquarters of those moved are: President, J. M. Eliot; Auditor, C. E. Conner; General Manager, C. W. Prosser, and Treasurer, W. G. Brockway. A site has been laid out for the new steel car works to be built at Ensley, which are expected to be in operation next fall.

The President of the Pressed Steel Car Co.

Charles T. Schoen, one of the founders of the Pressed Steel Car Co., has resigned as President, and is succeeded by F. N. Hoffstot, heretofore President of the Clinton Iron & Steel Co. Mr. Schoen will remain in the company's service as Chairman of the Board of Directors.

Mechanical Filtration Patent.

The House Committee on Patents decided on Jan. 28 by a vote of 6 to 2 to indefinitely postpone consideration of the extension of the Hyatt patent covering the use of a coagulant in mechanical filtration. The patent expires in February, and it is said that at the numerous hearings given in committee, the extension was opposed by over 250 cities and towns which are using the patent, including Cincinnati and other cities proposing mechanical filtration on a large scale.

THE SCRAP HEAP.

Notes.

The Lackawanna road has introduced an innovation in its eating service on some of its express trains. The coach nearest the buffet parlor car on each train which does not have a dining car is fitted up with four tables, with a special waiter in charge, in order to give passengers in the day cars the advantage of the buffet service without having to pay for a seat in the parlor car.

The 16 employees of the Delaware, Lackawanna & Western who recently went to Chicago to take a course of lessons in the air-brake room of the International Correspondence Schools, were enginemen, firemen, conductors and trainmen (brakemen), four of each class. These men, who had already begun taking courses of correspondence lessons from the school, went to Chicago at the invitation of the School, the purpose being to enable the men to complete their studies in the several lines in shorter time than would otherwise be possible and thus give a good start to the general work of the school among other employees of the road. The men, while in Chicago, attended three lectures daily—morning, afternoon and evening. Eight of the men stayed there two weeks and the other eight three weeks. The International Correspondence Schools now have a course of instruction in train rules which goes with the course in locomotive running and the course of trainmen. The Standard Code of the American Railway Association is the basis of the instruction in this department.

Traffic Notes.

The number of passengers going to the Southwest from Chicago in home seekers' excursions this year is larger than in any other year since 1893. Most of these people come from Wisconsin and Iowa.

The Attorney-General of Texas has filed a suit against the Texas Midland for penalties aggregating $180,000 for violation of the rules prescribed by the State Railroad Commission as to where cotton should be compressed.

The Southern Pacific and its connections are making very low "settlers' rates" to California on one day of each week, the rate from Omaha being $25, Chicago $30 and from New Orleans $27.50. These excursions will be run once a week until the end of April.

The Secretary of War announces that in the letting of contracts for the transportation of troops and supplies the Government will hereafter give preference to bond-aided roads. The passenger agents interpret this to mean that in sending troops to the Pacific Coast the Central Pacific will be favored.

Commissioner E. S. Tompkins, of the St. Louis Traffic Bureau, in his annual review of the work of the bureau for the past year, says many of the advances in rates made by changes in the classification have been made without regard to the effect it would have on shippers' business. While the Western Classification Committee gives the shipper notice of contemplated changes, the Official and Southern Classification Committees make the changes without giving the shipper a hearing, and notice reaches him often in the same week the change is effective, although business reasons may cause him to make sales 60 or 90 days before shipment. If he has sold at a delivered price these changes often result in his having a loss instead of a profit. This presents a strong argument for national classification. . . . The extremely low rates by lake and rail from Chicago to the Atlantic seaboard have prevented grain for export moving via St. Louis. There is great need of a line of boats from St. Louis to New Orleans. The steel barges which were finished late in October will no doubt demonstrate that they can meet the lake competition.

National Board of Trade.

The National Board of Trade, at a convention in Washington last week, discussed the pending amendments to the Interstate Commerce law. A report was adopted in favor of the Cullom bill, giving to the Interstate Commerce Commission the power to fix rates after investigation and hearing; but there was added a provision recommending the legalization of reasonable traffic agreements among the roads. A strong speech was made by a St. Louis member against giving the rate-making power to the Commission and insisting that rates should be subject to review by the courts. F. B. Thurber, chairman of this committee for the past four years, was inclined to take the same view. He declined re-election as chairman, but remains a member of the Committee on Transportation. William P. Trickett, of the Kansas City Transportation Bureau, was made chairman for the coming year. A motion by Mr. Thurber was adopted, that if the Cullom bill should not be passed at the present session of Congress, the committee should confer with the railroads as to proper legislation to be presented to the next Congress.

The St. Louis member referred to was Judge E. A. Noonan, representing the St. Louis Manufacturers' Association. He attacked particularly section 15, which gives a rate-making power, and inveighed against what he termed the imperialistic spirit of that section. He held that it was legitimate to prescribe that a rate shall be reasonable and then leave it to courts to determine what is not reasonable. "The construction of the words reasonable and unreasonable in our laws belongs to our courts. This basic right to construe can not be delegated. No commission can assume it. To clothe such a body with this power would be to garb it in the judicial ermine. The Cullom bill seeks to do this. It should not be permitted. The unreasonable in all time has sought to encroach upon the domain of the reasonable. The powers sought to be conferred by the Cullom bill are imperial.

New York Rapid Transit.

The New York Rapid Transit Commissioners have approved the plans for the extension of the underground railroad from the Post-office via Broadway to State street, thence under the East River to Joralemon street, Brooklyn; thence to City Hall square, Brooklyn.

Compressed Air Company of Ohio.

At a meeting held in this city of the directors of the Compressed Air Company of Ohio, a subsidiary company of the Compressed Air Company of New York, the following officers were elected: M. E. Ingalls, President; J. D. Ellison, Vice-President; Samuel McClure, Treasurer; and W. D. Brickell, Secretary. Among the Directors of this company are Perry F. Heath, Myron T. Herrick and John R. McLean.

Companies have been organized in Illinois and Massachusetts and one is being organized in Missouri.

Some American Chévaliers.

Among the list of those upon whom decorations of the Legion of Honor were bestowed in connection with the Paris Exposition are the following: J. Pierpont Morgan, J. W. Duntley, President of the Chicago Pneumatic Tool Company; Thomas B. Egan, President of the J. A. Fay & Egan Company; Alexander Gordon, of the Niles

Tool Works; Carl Hering, Henry M. Howe, Charles Miller, of the Standard Oil Company; Charles A. Moore, of Manning, Maxwell & Moore; Charles T. Schoen, President of the Pressed Steel Car Company, and George Westinghouse, President of the Westinghouse companies.

Motors for Madagascar.

Consul Gibbs reports from Tamatave, Dec. 3, 1900, that Mr. E. Cayeux, a sawmill owner of that city, invites correspondence in regard to liquid-air motors. Correspondence may be conducted in the English language.

Anthracite Coal for the Year.

Anthracite coal shipments last year amounted to 45,107,484 tons, as against 47,665,204 tons in 1899. The following table shows the amount each company carried and whether more or less than its quota:

	Gross tons.	Excess of quota.
Philadelphia & Reading	9,338,516	91,482
Lehigh Valley	6,969,442	*149,879
Central Railroad of New Jersey	5,309,856	32,280
Delaware, Lackawanna & Western	6,013,849	*8,000
Delaware & Hudson	3,973,859	*356,460
Pennsylvania Railroad	5,169,947	27,694
Pennsylvania Coal	2,090,153	285,854
Erie	1,741,069	*63,230
New York, Ontario & Western	1,658,457	260,125
D. S. & S.	1,568,488	*10,274
New York, Susquehanna & Western	1,333,848	*109,592
Total, 1900	45,107,484	

*Less than quota.

Technical Schools.

Purdue University.—Hon. Charles A. Prouty, of Washington, D. C., member of the Interstate Commerce Commission, delivered, on Jan. 21, an address before the Engineering students of Purdue University. His subject was "The Railroads and the People."

Washington University, St. Louis.—Work on the new buildings for this University, the plans for which were described in the *Railroad Gazette* some time ago, is progressing rapidly. Oct. 20, 1900, the cornerstone of Busch Hall was laid. This building, for the Department of Chemistry, is the gift of Mr. Adolphus Busch, of St. Louis, and will cost about $100,000. It is 291 ft. long and about 60 ft. wide, two stories high on the north front and three stories on the south front, and will contain the necessary laboratories, etc., beside lecture rooms, library, museums, offices, rooms for research work, and an assay laboratory. On Nov. 3, 1900, the cornerstone of University Hall was laid, the address being made by Col. George E. Leighton, who has been for many years a member of the Board of Directors. This building is the gift of Mr. Robert D. Brookings, of St. Louis, and will cost about $200,000. The main building is 261 ft. long and 51 ft. wide, and there are two wings each 119 ft. long x 32 ft. wide. These two buildings are the first of many which the University will build.

An Opinion Against the Chicago Drainage Channel.

Last Monday the United States Supreme Court gave an opinion in the case of the Chicago Drainage Channel overruling demurrers filed by the state of Illinois and the Sanitary District Board. The proceeding was brought by the state of Missouri to prevent the use of the canal because of pollution of the water supply of St. Louis. The opinion was by Justice Shiras, the Chief Justice and Justices Harlan and White dissenting. The demurrers appear to have turned on the points whether the state of Missouri and the state of Illinois were proper parties to the suit brought and whether, if the allegations of the bill do present a proper controversy for this Court, they are sufficient to entitle the state of Missouri to the relief prayed for. Justice Shiras says that if the complaint is true an adequate remedy can only be found in the Supreme Court at the suit of the state of Missouri. If the health and comfort of the inhabitants of the state are threatened, the state is the proper party to defend them. The health and comfort of large communities on the Mississippi River are not alone concerned, but contagious and typhoidal diseases may spread themselves throughout the territory of the state. The relief prayed for was not merely against the creation of a nuisance, but also against its maintenance. The demurrers are overruled and the defendant has leave to file answers to the bill. The dissenting opinion read by Chief Justice Fuller held that the jurisdiction of the Supreme Court should not be invoked and that it was difficult to conceive what decree could be entered in this case which would bind the state of Illinois or control its action. In his opinion the demurrers should be sustained and the bill dismissed without prejudice to a further application as against the Sanitary District. Counsel for the defendants in speaking of the opinion said that this now brings the case to a point where it will have to be tried on its merits.

Vibrations From an Underground Road.

On the invitation of the Central London Railway Company and a committee representing the owners of houses in the vicinity thereof, the Board of Trade have appointed a committee, consisting of Lord Rayleigh, F.R.S., chairman; Sir John Wolfe Barry, K.C.B., F.R.S., and Prof. Ewing, F.R.S., to consider to what extent the working of the traffic on the Central London Railway produces vibration in the adjacent buildings and what alterations in the conditions of such working or in structure can be devised to remedy the same and to report to the Board of Trade.

Residents in Paddington who considered themselves likely to be affected by the proposals of the West and South London Junction Electric Railway have passed a resolution to the effect that, considering the serious danger and great annoyance caused by the Central London Railway, no new bill affecting this district should be allowed to pass for the construction of a similar railroad until further experience has been obtained as to the effect of underground electric railroads on surface property, and what alterations in the condition of working or in structure can be devised to remedy the annoyance and vibration arising therefrom, and that in any case a proper clause should be inserted for providing compensation for damage.

The Trans-Siberian Railroad.

The Trans-Siberian Railroad authorities have had a great deal of trouble with Lake Baikal. The lake is about 65 miles wide, very deep, and exceedingly stormy the greater part of the year. The banks are very marshy for a long distance from the water line to the hard surface. At present they have large ice-breaking steamers of the American system. It sometimes happens that passengers and cars cannot be landed on the other side, in consequence of the storms on the lake, and are kept on board of the steamers from 25 to 40 hours at a time. At present, they have finished the surveying of two Kroogo-Baikal lines. The word "kroogo" means "circuit." One of these lines has been selected and will no doubt be built in the near future. This will run by way of Olchy and Toogoontchili, thus avoiding a number of tunnels, so that in the whole distance from Irkutsk to Kooltooga it will only be necessary to build two tunnels, each 1,120 ft. long. By this means, several million rubles will be saved which were expected to be expended in the construction of the line around the lake. Engineers believe that if the selected line is again carefully looked over even the two tunnels can be avoided, and in this case there will be no underground excavations to be made on this section.—*Consular Reports.*

Eclipse Expedition.

Preparations are being made by the Naval Observatory at Washington for an expedition to Dutch Sumatra to study the total eclipse of the sun on May 18 next, and a bill appropriating $10,000 for the expenses of the expedition has been passed by the House. Prof. Skinner, of the Naval Observatory, will have the direction of the party, which will include four members of the Observatory staff, and Prof. Barnard, of Yerkes Observatory, Chicago; Humphrey, of the University of Virginia; Abbott, of the Smithsonian; Mitchell, of Columbia, and Gilbert, of Johns Hopkins.

The Tehuantepec Railway.

In a letter to the London *Times* Sir Weetman Pearson tells something about the Tehuantepec Railway across the Isthmus of Mexico and says: "While years of futile endeavor and millions of capital have been expended in the hitherto abortive Panama scheme, and while the Nicaragua Canal proposal, with its estimated expenditure of £30,000,000, is still in embryo, we are within measurable distance of the completion of a cheap and practical pathway for the commerce between the Atlantic and the Pacific Oceans. By a contract recently entered into by the Mexican Government and my firm, we have become lessees for a period of 50 years of the Tehuantepec National Railway, from Coatzacoalcos, on the Mexican Gulf, to Salina Cruz, on the Pacific Coast. This railway, which is about 190 miles in length and crosses Mexico at its narrowest point, was built some years since by the Mexican Government; but was without terminal facilities for shipping. Harbors are now in course of construction which will give anchorage to the largest vessels in the merchant service; the quays and wharves will be fitted with the most modern machinery and appliances for the loading and discharging of vessels; the railway itself is being practically reconstructed to fit it for heavy traffic, and at an outlay of from two to three millions sterling, provided by the Mexican Government, and within a period of three to four years, the Tehuantepec route will be in a position to carry the whole trade between the two oceans. Merchandise discharged at one port will, within 24 hours, be alongside the vessel at the other port, at a cost not exceeding 10s. to 12s. per ton, including all harbor and railway charges. But it must not be forgotten, that whilst this route will so largely reduce the mileage from Great Britain to the west coasts of North and South America, and to China and Japan, yet, the advantage of such routes is in a more marked degree to the advantage of America."

Some of the Uses of a Legislature.

Messrs. Hambleton & Co., of Baltimore, always find something interesting to say in their weekly circular. This week they suggest a sermon on the text that "the assembling of our Legislature is always a signal for a decline in values." Unfortunately, this is sometimes true of other legislatures than that of Maryland.

American Rails for the Great Eastern (England).

It appears that the Great Eastern has recently ordered a quantity of rails and fish-plates from the Carnegie Steel Company. Sir Howard Vincent wrote to the Chairman of the Great Eastern to ask if the report were true, and Lord Claud Hamilton replied in the affirmative and added:

Our reasons for taking such a course are the obligations we are under to maintain our road in a high state of efficiency, and thus to provide for the safety of the traveling public. We have had during the past two years two contracts running for rails and chairs with one of the leading rail companies in England, and the final deliveries of the first contract were eleven months in arrear, whilst of the second we have not yet received a single rail, and it shows a deficiency of 9,000 tons, and this in spite of the most strenuous and continuous exertions on our part to insure punctuality in delivery. The consequence has been that our engineer has been seriously impeded in his work, and the necessary relaying of portions of our road have been unavoidably delayed. We had therefore no option but to go to where we knew we could rely upon good material and prompt delivery, and that at a price below what we should have been compelled to pay in England. I think you will admit that our action has been warranted under the circumstances.

The publication of Lord Claud Hamilton's side speedily brought to light the fact that British rail makers were in want of work, and could have turned out the Great Eastern order in a shorter time than the Americans have undertaken to deliver in, and at a lower price, too, not one of them was even asked to tender. The Great Eastern Railway Company has a perfect right to buy its rails in America, but we do not think any one will agree with Lord Claud Hamilton "that their action has been warranted under the circumstances." Moreover, his letter will be used for all it is worth by foreign manufacturers, and we do not see how the Great Eastern is to be benefited by thus discrediting British manufacturers.—*Railway Engineer.*

The Energy of the Universe.

The learned and pervasive Mr. Cope Whitehouse has again come forward with a brand new theory of the universal source of energy. He says "electricity is the primal source of heat and light. All light and heat are generated by the earth itself. No force is required for the generation of light and heat except the disturbance due to the rotation of magnetic masses (the planets). The finger of God set the planets spinning. Whether from inertia they keep moving or whether the same finger of God from time to time gives fresh impulse, or some other force supplies that impulse, transcends the limit of human knowledge." We venture to say that 10 years from now Mr. Whitehouse will stand amazed at his own moderation. Why does he admit that this question transcends the limit of his knowledge? Continuing, he says: "Hitherto it has been considered necessary to treat the sun as a vast center of combustion, sending out its light and heat rays into space. If the sun be considered as a large mass of matter turning on its axis then the disturbance set up by the varying electrical distance between the earth and the sun arising from their respective protuberances and depressions would create an electric current. If we suppose that a vibratory ray passes through the earth its interior may well be in a stage of incandescence, although no combustion is conceivable." We need go no further. Probably these quotations will give as clear a notion of this revolutionary theory as we shall ever get. Of course, it would be impertinent to suggest that possibly Mr. Whitehouse has got the cart before the horse. Incidentally, we venture to call his attention to one small error. He suggests that Cleopatra used a peacock feather screen to protect her cheek from "the same orb which tans but does not burn the cheek of the tourist on the banks of the Nile." We know at least one man who spent nearly five years on the banks of the Nile whose nose never ceased to peel in those five years, and he did not get much tanned, either.

A Plain Tale From the Hills [via Chicago].

"Absolutely unique in the history of railroading are the cowboy switchmen of Southern Chicago. With the introduction of automatic couplers and the present use of double-headed trains of 50 cars in length it was discovered that men on horseback could couple up trains much quicker than those on foot. This unique method has been tried with success in Walsenburg and Trinidad, Colo. Here are coal mines and hundreds of cars a day were handled formerly by footsore switchmen, who trudged many miles coupling trains. One day a cowboy dashed up and watched the switchmen at work. With a grunt he urged his pony across the tracks, rode fearlessly between the cars, arranged the coupler, then backed out and gave the signal for the engineer to back up. The coupling was made, and then the cowboy dashed further up the track, uncoupled another portion of the train, and in various ways performed the work of the regular switchman in half the time it would have taken him to do it. Three brothers named Berry learned the duties of switchmen, and then introduced their ponies. These animals had a special training and were taught not to balk at the cars, never to stand on the tracks, and to follow their owner along the train, should he climb on the car to set brakes."

We are amazed at the moderation of the reporter; he should have trained the ponies to climb on the cars, too.

LOCOMOTIVE BUILDING.

The Wheeling & Lake Erie is in the market for 10 engines.

The Missouri, Kansas & Texas is in the market for from 10 to 15 locomotives.

The Grand Trunk will build 12 engines at its Point St. Charles shops.

The Kansas City, Mexico & Orient will soon be in the market for locomotives.

The Rio Grande Western is having five engines built by the Baldwin Locomotive Works.

The Guatemala Central is having four locomotives built by the Baldwin Locomotive Works.

The Arizona & Southeastern is having one engine built by the Schenectady Locomotive Works.

The St. Louis, Troy & Eastern is having one locomotive built by the Richmond Locomotive Works.

The Chicago, Milwaukee & St. Paul, press reports state, will be in the market for 47 locomotives.

The Richmond, Fredericksburg & Potomac is having two engines built by the Baldwin Locomotive Works.

The Atchison, Topeka & Santa Fe has ordered 50 locomotives of various types from the Baldwin Locomotive Works.

The Chicago, Burlington & Quincy has ordered 20 locomotives from the Baldwin Locomotive Works and is building 10 at its Burlington shops.

The Northern Pacific has contracted with the Schenectady Locomotive Works for 25 engines, 20 of which will be switching engines and the balance for freight and passenger service. This is in addition to the order for 50 reported in our issue of Dec. 7, 1900.

The Louisville & Nashville order with the International Power Co., mentioned in our issue of Jan. 4, calls for 10 simple consolidation and five 10-wheel locomotives. The consolidation engines will weigh 160,000 lbs. with 143,000 lbs. on the drivers; will have 21-in. x 26-in. cylinders, 51-in. driving wheels, Belpaire boilers with a working steam pressure of 180 lbs., and 224 tubes 2¼ in. in diam. and 14 ft. long, fire-boxes 9 ft. long and 3 ft. 4 in. wide, and a tender capacity for 5,000 gals. of water and 10 tons of coal. The ten-wheelers will weigh 150,000 lbs. with 115,000 lbs. on the drivers, will have 20-in. x 26-in. cylinders, 67-in. driving wheels, Belpaire boilers with a working steam pressure of 180 lbs., 274 tubes 2 in. in diam. and 13 ft. 3 in. long, fire-boxes 10 ft. long and 2 ft. 9½ in. wide, and a tender capacity for 5,000 gals. of water and 10 tons of coal. The special equipment for all includes: New York air-brakes, Carbon Steel Co. nickle axles, Sterlingworth brake-beams, Monitor injectors, U. S. Metallic packing, Coale safety valves, A. French springs, Minor draft riggings on tenders and Leed's pilots.

CAR BUILDING.

The Pullman Co. is building 23 cars for general service.

The American Cereal Co. has asked bids on 500 box cars.

The Louisville & Nashville has asked prices on 250 box cars.

The Pennsylvania, it is reported, will order more freight cars.

The Chicago & Grand Trunk is reported in the market for freight cars.

The Baltimore & Ohio is reported to have asked bids on 1,000 to 1,500 cars.

The American Trading Co. has ordered a number of freight cars for export.

The Indiana, Illinois & Iowa is in the market for 500 cars of 80,000 lbs. capacity.

The Chicago & Alton is preparing specifications for a large number of freight cars.

The Wheeling & Lake Erie is in the market for from 500 to 1,500 cars of 80,000 lbs. capacity.

The Chicago, Burlington & Quincy is in the market for about 1,000 stock and 500 gondola cars.

The American Sugar Refining Co. is reported to be contemplating ordering about 300 box cars.

The Chicago, Milwaukee & St. Paul has ordered 50 ballast cars from the Rodger Ballast Car Co.

The American Car & Fdy. Co. has received an order for 100 refrigerator cars from a private car line.

The Missouri, Kansas & Texas is reported to have ordered 2,000 cars from the American Car & Fdy. Co.

The Nashville, Chattanooga & St. Louis will not at present order the passenger cars for which it has asked bids.

The Delaware, Lackawanna & Western has placed an order with the Barney & Smith Car Co. for 15 passenger cars.

The Pittsburgh Coal Co. has ordered 500 coal cars of 80,000 lbs. capacity from the Illinois Car & Equipment Co., and 500 of the same kind from the Pressed Steel Car Co.

The Toledo, Peoria & Western order with the Pullman Co., for two combination passenger and baggage cars, referred to recently, calls for March delivery. They will measure 60 ft. long and be equipped with Westinghouse brakes and the Gold combination system of steam heat.

The Chicago, Rock Island & Pacific has ordered 500 box cars of 60,000 lbs. capacity from Pullman, as noted in our issue of Jan. 25. These cars are for May delivery. They will be 34 ft. long and equipped with Sterlingworth brake-beams, Westinghouse air-brakes, Janney couplers, McCord journal boxes and Murphy roofs.

The Pressed Steel Car Company lately got an order from the Rand Mines, Ltd., for 167 pressed steel hopper gondola coal cars, of 60,000 lbs. capacity. On Jan. 28 the first consignment of 30 cars was lying alongside the steamer "Elleric" in Jersey City. Thirty more of the cars were shipped to Jersey City Jan. 29, and by Feb. 4 the remaining 107 cars will be on the dock.

The Northern Pacific has ordered 3,000 box, 800 flat and 450 coal cars from the American Car & Foundry Co. The special equipment includes Chicago-Cleveland roofs, Dunham doors with Security protection strips on the box cars, American steel bolsters and Sterlingworth brake-beams. These cars will be built at the Detroit shops and are for Sept. 1 delivery. The road has also asked bids on 250 stock cars.

The Chicago, Rock Island & Pacific has ordered 31 cars for passenger service from the Pullman Co., divided as follows: Eleven 60 ft. chair cars, two 70 ft. dining cars, eight coaches, 6 baggage and mail cars, and four baggage cars, all for October delivery. The special equipment includes National-Hollow brake-beams, Westinghouse brakes, Janney couplers, Safety heating system, McCord journal boxes, Pintsch light, Standard steel platforms, Scarritt seats and McKee-Fuller wheels.

BRIDGE BUILDING.

Allegheny, Pa.—The Shady avenue bridge, reported in this column last week, will be about 700 ft. long and 50 ft. wide. We are told that bids will be wanted some time next spring by Robert McAfee, Director of the Department of Public Works. The bridge will cross Woods Run, Woods Run avenue and Lecky avenue, connecting Geyer avenue and Shady avenue. Plans are now being made for a structure to cost $65,000. G. C. Langenheim, Superintendent, Bureau of Engineering and Surveys.

Baltimore, Md.—A committee has been appointed by the City Council to consult with the Baltimore & Ohio R. R., in regard to abolishing grade crossings in Baltimore.

Boston, Mass.—The following bids were received Jan. 19 by City Engineer Wm. Jackson for a steel draw for the new Malden bridge over Mystic River, Charlestown: Canton Bridge Co., $16,650; American Bridge Co., $15,653; Toledo Bridge Co., $15,800; The King Bridge Co., $16,213; Eastern Bridge & Structural Co., $15,920; Boston Bridge Works, $16,900; New England Structural Co., $15,200 (awarded); G. P. Bullard & Co., Boston, $16,848.

Buffalo, N. Y.—A bill is before the Legislature appropriating $25,000 for the proposed bridge over the Clark & Skinner Canal at Ohio street. Another bill is before the Legislature making an appropriation for a bridge over the canal at the Grand Island ferry.

The New York Central is reported to have agreed to pay 60 per cent. of the cost of removing the grade crossings on the Belt Line. Bridges will be built at Amherst street, Main street, Delavan avenue, Leroy avenue and Jewett avenue.

It is stated that the Erie R. R. is ready to build an overhead crossing in Louisiana street.

Canajoharie, N. Y.—It is proposed to build a riveted truss bridge, on stone piers, over the Mohawk River to replace the one recently destroyed. The spans will be of the following lengths: 134, 145, 112 and 110 ft. F. L. Burton, Town Clerk.

Catasauqua, Pa.—The Catasauqua Bridge & Terminal Co. proposes to begin work early in the spring on its proposed railroad bridge over the Lehigh Valley, Central R. R. of New Jersey, and the Lehigh River, to replace the old Bridge street bridge.

Chamberlain, S. Dak.—The House on Jan. 28 extended the time for building a bridge across the Missouri River between Tacoma and Chamberlain by the Chicago, Sioux Falls & Pacific to Jan. 28, 1902.

Cincinnati, Ohio.—The lowest bids reported received for the Eighth and Liberty street viaducts were by the Brackett Bridge Co., at $23,479, and L. P. Hazen & Co., at $38,837.

Denver, Colo.—The Villa Park & Barnum Improvement Society has been organized to have a viaduct built across the Platte River, at a cost of about $50,000.

Dothan, Ala.—The Dothan, Hartford & Florida R. R., J. P. Pelham, President, wants five bridges.

Evansville, Ind.—According to report, the Commissioners have adopted plans and specifications for nine small iron bridges for which bids are wanted Feb. 18.

H. C. Barlow, President of the Evansville & Terre Haute R. R., is reported as stating that a steel bridge will be wanted by his company, which will cost about $25,000.

Fort Dodge, Iowa.—Private subscriptions have been made toward building the viaduct on Third street over the Chicago, Rock Island & Pacific and the M. & St. L. R. R., and over Soldier Creek in the northern part of the city. It will cost between $10,000 and $15,000.

Geneva Co., Ala.—A bill authorizing the Chattahoochee & Gulf R. R. to build a bridge across the Choctawatchee River in Geneva Co., Ala., was passed by the House on Jan. 28.

Indianapolis, Ind.—Bids are wanted Feb. 11, according to report, for a bridge over White River, about half a mile west of Broad Ripple; also for the superstructure of a steel bridge over Big Eagle Creek on the Crawfordsville gravel road. Harry B. Smith, County Auditor; James E. Greer, Chairman of the Board. (Nov. 20, 1900, p. 800.)

The Indianapolis & Martinsville Traction Co. will place contracts within the next two months for 31 miles of road and five bridges.

Kansas City, Kan.—The Missouri Pacific has under consideration extensive improvements in its yards at Kansas City, Kan., which require a steel bridge across the Kaw River.

Laport, Ind.—An appropriation of $15,000 has been made by the County Council for bridges for which bids will be wanted at the February meeting. Henry Wilhelm, President.

Lestershire, N. Y.—The Delaware, Lackawanna & Western will build a new bridge over the tracks on Main street.

Macon, Ga.—An election will be held Feb. 19 to vote on an issue of $70,000 bridge bonds.

Michigan City, Ind.—An appropriation has been made for a drawbridge on Second street over the harbor. Harry M. Miles, City Engineer.

Miles City, Mont.—The County Clerk, according to report, will receive bids until March 4 for a steel bridge across Tongue River.

Moline, Ill.—The House on Jan. 28 passed a bill authorizing the Moline & Peoria R. R. to build a bridge across the Rock River in Illinois.

Mount Vernon, N. Y.—The Wrought Iron Bridge Co. has the contract for the four bridges over the Hutchinson River, as follows: 112 ft., $26,000; 28 ft. 6 in., $5,000; 34 ft. 6 in., $4,090; 47 ft. 6 in., $5,090. The last three are concrete-metal arches of the Thatcher type.

Newburyport, Mass.—The Essex County Commissioners have under consideration a bridge across the Merrimac River, to cost about $1,000,000.

New Bedford, Mass.—The following bids were received Jan. 23, for the new portion of the New Bedford and Fairhaven bridge:

Foundation and Roadway: Miller & Ellis, Boston, $152,865; Norcross Brothers, Worcester, $162,400; J. W. Bishop & Co., Providence, $179,515; Frank Pigeon, New York, $199,549.

Metal Work: American Bridge Co., New York, $94,540; North Pennsylvania Iron Co., North Pennsylvania Junction, Philadelphia, $103,000; Eastern Bridge & Structural Co., Worcester, $105,000; Variety Iron Works Co., Cleveland, O., $107,500; Boston Bridge Works, Boston (conditional bid), $109,480; King Bridge Co., Cleveland, O., $112,400; New England Structural Co., Boston, $112,747; Pennsylvania Steel Co., Steelton, Pa., $119,746; Canton Bridge Co., Canton, O., $121,000; Toledo Bridge Co., Toledo, O., $125,000; John E. Buddington, New Haven, Conn., $133,000.

New Hamburg, N. Y.—The New York Central & Hudson River R. R. has contracted with the American Bridge Company for two drawbridges, which are to be operated by gasolene engines; one of them to be located near New Hamburg, N. Y., and the other one near Little Ferry, Bergen County, N. J. Both are through plate girder bridges with double track.

New York, N. Y.—Plans have been submitted to the Board of Estimate for a bridge over East Chester Bay in Pelham Bay Park. It will be about 1,180 ft. long and cost about $350,000.

Niles, Mich.—A new bridge, the superstructure of which is to cost $10,000, will be built across the St. Joseph River at Main street.

North Tonawanda, N. Y.—A bill is before the Legislature appropriating $20,000 for a bridge over the slip connecting the Erie Canal with the Niagara River.

Olean, N. Y.—J. R. Droney, President of the J. R. Droney Lumber Co., informs us that he will receive bids until Feb. 15 for a plate girder bridge 200 ft. long to cross Castleman River at Confluence, Pa.

Peshtigo, Wis.—Bids are wanted until March 1 for a three-span bridge, 192 ft. long, over Peshtigo River. Wm. Ellis, Jr., Chairman, Town Board. (Jan. 11, p. 31.)

Pittsburgh, Pa.—It is stated that plans have been agreed upon for a wider bridge at South Tenth street over the Monongahela River. The Pittsburgh & Birmingham Traction Co. has agreed to pay part of the cost. (Dec. 14, 1900, p. 833.)

The American Bridge Co. has the contract for the superstructure of the new double deck bridge across the Allegheny River for the Pennsylvania Lines. It will require about 7,000 tons of steel, and will be finished by Jan. 1, 1902.

The Grand Jury has approved the petition for a bridge over Wildcat Run in Elizabeth Township.

Portsmouth, N. H.—Bids are wanted Feb. 16 for a railroad trestle bridge, 292 ft., at the Navy Yard, at Portsmouth, N. H. Address Mordecai T. Endicott, Chief of the Bureau of Yards and Docks, Navy Department, Washington, D. C.

Sioux City, Iowa.—We are informed that J. M. Lewis is making plans for the bridge proposed over Perry Creek at Third street. (Oct. 19, 1900, p. 694.)

Sparta, Tenn.—The counties of White and Van Buren have appointed a joint committee to consider the advisability of building a bridge over Caney Fork at Sparta and the Spencer Road crossing.

Springfield, Mass.—The selectmen of the towns of Agawam and West Springfield are considering the preliminary plans that were made by Collins & Norton for the proposed bridge over the Agawam River.

Springfield, Ohio.—A viaduct is proposed over Gallagher street, according to report.

Stockton, Cal.—The Sacramento & San Joaquin Valley, according to report, will build a drawbridge across Stockton Channel, to be finished within three years.

Vicksburg, Miss.—Four iron bridges will be necessary on the new road in the National Military Park at Vicksburg. Two of the bridges will be 330 ft. long. G. C. Haydon, Assistant Engineer.

Watertown, N. Y.—Bids will probably be wanted in a short time for the Arsenal street viaduct. It is to be a steel structure 825 ft. long, across the R. W. & O. division of the New York Central & Hudson River. It will cost between $28,000 and $33,000. C. O. McComb, City Engineer.

Waukesha, Wis.—A bridge will be built over Fox River at Locust street, according to report.

Winnipeg, Man.—Four large steel bridges are to be built shortly in Manitoba: One on the Canadian Pacific, for which the Dominion Bridge Co. has the contract at $175,000 for the steel, will be 780 ft. long, over the Red River; another is for the Canadian Northern, for which D. B. Hanna, Superintendent, is receiving bids until March 1, for a structure 750 ft. long, estimated to cost $170,000. Mackenzie & Mann, of Toronto, owners of the Canadian Northern, are reported receiving bids for a 500-ft. steel structure over Rainy River at Fort Francis, which is to cost about $100,000. Another bridge for the Canadian Pacific is over Pembine River at La Riviere, which is to be a 100-ft. steel structure and cost about $10,000.

Other Structures.

Cincinnati, Ohio.—Bids will be received by Ward Baldwin, Mitchell Bldg., Cincinnati, until Feb. 11, for a steel structure and foundry building complete for the Lane & Bodley Co.

Colorado Springs, Colo.—Last week fire destroyed the Denver & Rio Grande freight depot in Colorado Springs, causing a loss of about $100,000.

Depot Harbor, Que.—Jos. R. Roy, Acting Secretary, Department of Public Works of Canada, Ottawa, Ont., will receive bids until Feb. 22 for an addition to the elevator wharf at Depot Harbor. Check for $25,000 must accompany all tenders.

Hannibal, Mo.—The coach, upholstering and milling departments and dryhouse, composing part of the shop plant of the Burlington, were destroyed by fire Jan. 24, causing a loss of about $125,000.

Joliet, Ill.—Regarding the report that the Pressed Steel Car Co. is rebuilding the Fox plant at Joliet, we are informed that the company is only putting this plant in shape, so that they can go ahead with making truck frames, bolsters, etc. Nothing definite has been decided as to what extent the burned portion will be rebuilt.

Kansas City, Mo.—The cable power house of the Metropolitan Street Ry. at Ninth and Washington streets was destroyed by fire Jan. 26. The loss was about $75,000. Sixty cars were also destroyed.

Philadelphia, Pa.—The Pennsylvania R. R. will build a coal pier at Greenwich Point in the lower part of the city. Contracts are reported let. The pier will be 739 ft. long and 60 ft. wide.

Pittsburgh, Pa.—The Pittsburgh Valve, Foundry & Machine Co. is considering plans for consolidating a number of the plants.

Springfield, Ohio.—The Cleveland, Cincinnati, Chicago & St. Louis, according to report, will begin work at once on its proposed new freight station between Washington, Union and Fountain avenues, Springfield, Ohio. (Nov. 23, 1900, p. 783.)

Wheeling, W. Va.—The Baltimore & Ohio will build a temporary passenger station on South street, while arrangements are being made for a permanent station.

Wilmington, Del.—Work will soon be begun on the addition to the mills of the Diamond State Steel Co.

Work on the $5,000,000 plant of the Delaware Forge & Steel Co. will soon be begun.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

Canadian Society of Civil Engineers.

The annual meeting of the Canadian Society of Civil Engineers was held in Montreal last week. Among the officers elected were: President, Mr. E. H. Keating, Toronto; Vice-Presidents, Messrs. G. H. Duggan and E. Marceau, Montreal, and C. H. Rust, Toronto. The members of Council elected were Messrs. Kennedy, Anderson, Mountain, MacPherson, Archibald, Campbell, Butler, Galbraith, Ross, Poole, Rogers, Hering (R., of New York), Chipman, Smith and McConnel.

American Society of Civil Engineers.

At the meeting of Feb. 6 Prof. Crandall's paper on "The Adjustment of a Transit Survey, Etc." will be presented, and on Feb. 20 a paper by Mr. G. N. Houston will be presented on "The Construction of Gravity Sand Filters at Nyack." On March 6 the paper will be on "Flow in Sewers of the North Metropolitan Sewerage System of Massachusetts," by Mr. Theodore Horton.

The Thirty-third Annual Convention will be held at Niagara Falls, N. Y., June 25 to 28, inclusive.

Engineers' Club of St. Louis.

The 519th meeting was held at 8:30 p. m., Jan. 16, President Spencer presiding. The subject of the evening was a paper by Prof. J. L. Van Ornum, entitled "The Purification of Sewage by the Septic Process." Prof. Van Ornum first reviewed the development of the septic process, in practice and in theory, and then discussed the problems needing further study and how such investigations might be made. He considered the system beyond the experimental stage and that it had been thoroughly tried and proven a success. The author expected that as the application of established principles are perfected and further investigations are made, its efficiency will become still greater and its field of application be extended. Discussion of the paper was participated in by Messrs. Russell and A. L. Johnson.

The Chair announced the appointment of the following Entertainment Committee: H. H. Humphrey, Chairman; D. W. Roper, W. H. Reeves.

The Engineers' Club of Philadelphia.

A business meeting of the club will be held on Saturday, Feb. 2, at 8 o'clock p. m., at which time a paper on "Chain Transmission of Power; and By-Products of Coke Ovens," illustrated, will be read by Mr. Charles Piez.

At the meeting, on Jan. 19, Prof. Edgar Marburg, retiring President, presented the paper of the evening upon "Nineteenth Century Engineering: Its Evolution and Something of Its Beginnings in America." After a brief review of the early history of science up to the be-

ginning of the present century, he pointed out the fact that engineering was then still the art without the science of construction. He traced the progress due to the use of steam power, the development of canal transportation, the history of framed structures, which as a science began only in 1847; the development in the use of engineering materials made possible by progress in metallurgy, and the enormous progress for professional education made in the number and character of engineering schools, societies and publications.

The officers for 1901 are: President, Henry Leffmann; Vice-President, Edwin F. Smith; Secretary, L. F. Rondinella; Treasurer, Geo. T. Gwilliam; Directors (for two years), Silas G. Comfort, Minford Levis, W. B. Riegner.

Western Railway Club.

A meeting of the Western Railway Club was held Tuesday afternoon, Jan. 15, at the Auditorium Hotel, Chicago. The Secretary stated that the membership of the Club is now 921; during the past month there has been an addition of 29 members. The following committees on revision of the Interchange Rules were appointed: On freight car rules, J. J. Hennessey, Chicago, Milwaukee & St. Paul; F. H. Stark, Cleveland, Lorain & Wheeling; and P. H. Peck, Chicago & Western Indiana. The committee on passenger car rules is: C. A. Schroyer, Chicago & Northwestern; J. E. Buker, Illinois Central, and R. D. Smith, Chicago, Burlington & Quincy. The committees are expected to report at the April meeting.

Mr. George R. Gillon, of the Watson-Stillman Co., presented a paper on hydrostatic tools, including a description of hydraulic jacks, presses, etc. The paper brought out little discussion, but a rather interesting point was suggested by Mr. G. R. Henderson that there may be advantages in hydraulic presses over steam hammers for forgings made in railroad shops. In fact, Mr. Henderson went so far as to predict that steam hammers would be replaced by hydraulic presses for large work in railroad shops and for many small forgings as well. No one, however, seemed to know much about forging presses and the discussion on this point was brief.

The paper on locomotive hot-boxes by Mr. M. E. Wells, of the Burlington & Missouri River, was discussed at great length, but there was no agreement as to methods for preventing hot-boxes. The principal point which Mr. Wells emphasized was the need of greater care and attention in maintaining boxes. Mr. Henderson said that great care is also required in the selection of materials. For instance, iron axles are often imperfectly welded at the journals and these seams appear to act as cutting edges and abrade the bearing metal and cause heating. He thinks the present method of lubricating locomotive driving boxes is the crudest in existence, and he is experimenting with a force lubricator which gradually feeds oil down through the top of the driving box. The engine on the Chicago & Northwestern, which has been equipped with this device has only been in service a short time and little is yet known about its efficiency. The question of placing the oil grooves at the sides instead of at the top of the driving box was discussed by Mr. S. P. Bush and others and the side grooves were disapproved. The objection seems to be that these side grooves fill up quickly with small particles of waste and other foreign matter and the supposed advantages are not realized.

The next meeting will be Feb. 19, and two papers will be presented. One will be by Prof. Storm Bull, of the University of Wisconsin, entitled "The Paris Exposition," and the other will be by Mr. G. W. Rhodes on "Bolts, Nuts and Keys in Engine and Car Construction."

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. Edwin McNeil died suddenly of Bright's disease January 28, in New York city. He was born in Macon, Ga., forty-five years ago and was a graduate of West Point Military Academy. In 1880 Mr. McNeil became Assistant Superintendent of the Shepaug Railroad and the following year Superintendent. In July, 1885, he was appointed General Superintendent of the Hartford & Connecticut Western, then in 1888 became General Manager of the St. Joseph & Grand Island, and in 1894 Receiver and General Manager of the Oregon Railroad & Navigation Company.

—Mr. E. J. Sanford, as recently noted in these columns, becomes President and Superintendent of the Union Depot Co., of Kansas City, Mo. Mr. Sanborn was born in Canton, St. Lawrence County, N. Y., June 5, 1848, and entered railroad service in 1861 at Dwight, Ill., as station baggagemaster and telegraph student. He went into the army and, after serving through the Civil War, returned to Dwight and re-entered railroad service with the Chicago & Alton, serving through various grades up to conductor, until April, 1883; Trainmaster at Kansas City until 1889; Assistant Superintendent in charge of the Kansas City Division at Slater, Mo., until 1893, when his position was abolished. He was then selected by the Superintendents' Association at Kansas City, Mo. (which he had served as Secretary for about eight years) to become Chief of the Kansas City Joint Inspectors' Association. He remained with that Association until January, 1897, when he joined his present company as Superintendent of the Union Depot at Kansas City. He now becomes also President.

—Mr. W. H. Peddle, as recently noted, has been made General Superintendent of Transportation of the Southern Railway at Washington, D. C. Mr. Peddle was born at Indianapolis, Ind., Sept. 21, 1850. He was graduated from the high school at Terre Haute, Ind., in 1868, and took two years at the Polytechnic College of the State of Pennsylvania. Then he entered the service of the Evansville, Terre Haute & Chicago, which was at that time building, as rodman. In November, 1870, he entered the service of the Central of New Jersey and continued with that company until January, 1898, serving as clerk, draughtsman, Assistant Engineer, etc., until June, 1883; as Division Roadmaster and Division Engineer until October, 1889, and then as Division Superintendent. He was appointed General Superintendent Maintenance of the Southern, his present company, in January, 1898, continuing until November, 1900, when he became Assistant General Manager. He took his present position of General Superintendent of Transportation on Jan. 1 last.

—Mr. M. F. Bonzano, as recently noted, is Chief Engineer of the re-organized Toledo, St. Louis & Western. Mr. Bonzano was born at Detroit, Mich., May 13, 1858. After being graduated from the Rensselaer Polytechnic Institute at Troy, N. Y., in 1878, he entered the service of the Philadelphia, Wilmington & Baltimore as Assistant Engineer. When the Pennsylvania took control of his company, he was employed as Assistant Engineer by that company, and had charge of extensive improvements in Philadelphia. Early in 1882 he was transferred to the General Superintendent's office at Altoona, and resigned in October of the same year, entering the service of the Philadelphia & Reading as Assistant Engineer at Philadelphia. He continued with that company until it went into the hands of receivers in 1893, serving from Roadmaster to General Superintendent. He entered the service of the South Jersey R. R. in 1894 as Assistant Manager, was made General Superintendent the following year, and in 1896 became General Manager of the Chattanooga Southern. The year following he was General Agent for the Receiver of the Columbus, Sandusky & Hocking, and was afterwards made Superintendent and Chief Engineer of the same road. He again returned to the service of the Chattanooga Southern in 1898 as General Manager. He resigned on June 1, 1900, and acted thereafter as Consulting Engineer. His appointment as Chief Engineer of the Toledo, St. Louis & Western took effect Jan. 15 last. He is a member of the American Society of Civil Engineers, the American Society of Railroad Superintendents and other organizations. He did good work in two great strikes, one being that of the Knights of Labor on the Philadelphia & Reading in 1887, while he was Superintendent of the Philadelphia and New York Division; the other the switchmen's strike at Buffalo in 1892. The Lehigh Valley was under lease at that time to the Philadelphia & Reading, and Mr. Bonzano was sent to Buffalo to take charge of the interests of the two companies.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—C. W. Kouns, heretofore Superintendent of Car Service, has been appointed Assistant General Superintendent at Topeka, Kan. F. C. Fox succeeds Mr. Hurley, promoted, as Division Superintendent at Las Vegas, N. Mex. G. E. Ayer succeeds Mr. Fox as Division Superintendent at Pueblo, Colo., and Mr. Ayer in turn is succeeded by T. J. Whisnand, who was heretofore Assistant Division Superintendent at Chanute, Kan., as Division Superintendent at Wellington, Kan.

Brooklyn Rapid Transit Company.—B. W. Folger, Jr., has been appointed General Superintendent, succeeding George W. Edwards, resigned, effective Feb. 1.

Buffalo, Hamburg & Aurora.—Albert Culver was, on Jan. 23, elected President and A. B. Stearns Vice-President. (See R. R. Construction column, Jan. 25, p. 69.)

Chattanooga & Lookout Mountain.—The officers of this company are: President, S. W. L. Divine; Vice-President, R. W. King, and Secretary, W. Carey. (See R. R. Construction column, Jan. 18, p. 51.)

Chicago & Northwestern.—The following appointments have been made effective Jan. 15: Charles S. Hall, Engineer of Track Elevation at Chicago, Ill.; Willard Beahan, Division Engineer at Winona, Minn.; Chester T. Dike, Resident Engineer at Peoria, Ill.; H. E. Stannard, Acting Division Engineer, at Baraboo, Wis., succeeding B. J. Sweatt, transferred; Barton J. Sweatt, Division Engineer at Mason City, Ia., succeeding C. T. Dike, transferred, and Albert W. Merrick, Division Engineer at Eagle Grove, Ia.

Cincinnati, Portsmouth & Virginia.—At a meeting of the Board of Directors held Jan. 22, Henry Fink was elected President, succeeding Samuel Hunt, resigned. These officers were also elected: A. J. Hemphill, Assistant Secretary, succeeding J. J. Collier, resigned, and W. G. Macdowell, Assistant Treasurer. The following appointments have been made to take effect same date; L. E. Johnson, General Manager, succeeding T. D. Rhodes, resigned; M. C. Jameson, Comptroller; Joseph W. Coxe, Auditor, succeeding W. D. Gray, resigned; E. T. Burnett, Purchasing Agent; Joseph I. Doran, General Solicitor, with headquarters at Philadelphia, Pa.; James C. Cassell, General Superintendent; T. S. Davant, General Freight Agent; E. F. Gray, Assistant General Freight Agent at Cincinnati, Ohio; W. B. Bevill, General Passenger Agent; T. D. Rhodes, Assistant General Passenger Agent at Cincinnati, Ohio; W. H. Lewis, Superintendent Motive Power, and Charles S. Churchill, Engineer Maintenance of Way. The headquarters of Messrs. Johnson, Jameson, Coxe, Burnett, Cassell, Davant, Bevill, Lewis and Churchill will be Roanoke, Va. V. A. Riton becomes Superintendent at Kenova, W. Va., and J. C. Gleason, Assistant Superintendent at Cincinnati, Ohio. W. D. Gray has been appointed Assistant Auditor with headquarters at Cincinnati, Ohio.

Columbia Southern.—Geo. J. Mohler, General Manager at Shaniko, Ore., has resigned.

Columbus, Lima & Milwaukee.—John W. Lutz has been appointed General Superintendent, with headquarters at Defiance, Ohio.

Conneaut & Eastern.—The officers of this newly incorporated company are: President, James H. Reed; Vice-President, L. C. Phipps, and Secretary and Treasurer, W. W. Blackburn. (See R. R. Construction column, Jan. 18, p. 51.)

Delaware, Lackawanna & Western.—J. M. Daly, Superintendent of Transportation, having resigned (p. 69) the position is abolished and the duties assumed by T. E. Clarke, General Superintendent, effective Feb. 1.

Great Northern.—C. H. Putnam has been appointed Superintendent of Shops, with headquarters at Spokane, Wash., succeeding J. A. Steele, resigned.

Gulf, Beaumont & Kansas City.—W. W. Willson, Assistant General Manager at Beaumont, Texas, has resigned.

Hocking Valley.—On Jan. 21, R. W. Hickok was elected First Vice-President and J. H. Hoyt Second Vice-President.

Indiana, Illinois & Iowa.—W. C. Sanders has been appointed Superintendent of Telegraph, with headquarters at Kankakee, Ill.

Kansas City, Fort Scott & Memphis.—A. Hilton has been appointed Assistant General Passenger Agent.

Louisville, Anchorage & Pewee Valley.—The officers of this company are: President, H. H. Bechtel, Cincinnati, Ohio; Vice-President and Treasurer, Percival Moore, Louisville, Ky., and Secretary, James F. Buckner, Jr., Louisville. (See R. R. Construction column, Jan. 25, p. 69.)

Mexican Central.—T. F. Brady has been appointed Master Mechanic of the Chihuahua Division, with headquarters at Chihuahua, Mex., succeeding H. W. Ridgway, resigned, effective Jan. 31.

Minneapolis, St. Paul & Sault Ste. Marie.—H. C. Pearce has been appointed Purchasing Agent, succeeding J. E. Shaughnessy resigned, effective Jan. 25.

Nebraska & Gulf.—The officers of this company are: President, John Keedle; Vice-President, J. R. Cessna; Treasurer, J. D. Mines; Secretary, T. J. Creeth, and Attorney, H. S. Dungan. (Construction Supplement, July 27, 1900.)

New York Central & Hudson River.—The position of Traffic Manager of the West Shore has been abolished. The General Freight Agent of the W. S. will report to the Traffic Manager of the N. Y. C. & H. R., Nathan Guilford, and the General Passenger Agent to Geo. H. Daniels, General Passenger Agent of the N. Y. C. & H. R.

Pennsylvania.—Lewis Neilson, heretofore Assistant Secretary, has been appointed Secretary, succeeding the late J. C. Sims.

Pennsylvania Company.—Robert Ferriday has been appointed Engineer Maintenance of Way of the Northwest System, at Toledo, Ohio, succeeding A. H. Sanford, transferred as Engineer Maintenance of Way at Louisville, Ky.

On Feb. 1, R. Reed becomes Assistant Treasurer; M. C. Spenser, Cashier (Southwest System), J. H. Frederick, Cashier, and R. W. Morrison, Paymaster (Northwest System).

San Francisco & San Joaquin Valley.—Alex. Mackie, Secretary at San Francisco, Cal., has resigned.

Southern.—H. B. Spencer, Assistant General Manager of the St. Louis-Louisville Lines, has been appointed General Manager of those lines, with headquarters at St. Louis, Mo., succeeding Geo. C. Smith, resigned, effective Feb. 1.

Temiscouata.—D. B. Lindsay, General Passenger and Freight Agent, has been appointed General Manager, succeeding T. Crockett, resigned.

Union Pacific.—George Lang has been appointed General Agent of the Freight and Passenger Departments, with headquarters at 250 South Spring street, Los Angeles, Cal., succeeding F. S. McCormick and P. O. Prince, assigned to other duties, effective Feb. 1.

Waycross Air Line.—G. W. Guess has been appointed Purchasing Agent, with headquarters at Waycross, Ga., effective Jan. 10.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

AKRON & NILES.—This company was incorporated in Ohio, Jan. 23, with a capital stock of $15,000, to build a railroad from Akron east about 40 miles through Summit, Portage and Trumbull counties to Niles. The incorporators are: Chas. W. French, C. D. Crouch, V. A. Dehnel, E. C. Hurd and Curtis E. McBride.

The same men on that date incorporated the Alliance & Pittsburgh, of Mansfield, with a capital stock of $20,000, to build a railroad from Alliance east to the Pennsylvania State line. Mr. McBride is an attorney for the Baltimore & Ohio, which is supposed to be back of these roads.

ALLIANCE & PITTSBURGH.—See Akron & Niles above.

ATCHISON, TOPEKA & SANTA FE.—Surveys are reported in progress for an extension of the Gulf, Colorado & Santa Fe from San Angelo, Tex., west about 175 miles to Pecos City, to connect with the Pecos Valley & Northeastern.

BALTIMORE & OHIO.—The bills for the new terminals and track elevation at Washington, D. C., for this company and the Baltimore & Potomac line of the Pennsylvania, have passed both the Senate and House, and have been sent to conference. (Dec. 28, 1900, p. 868.)

BERKSHIRE STREET.—This company has been organized at Winsted, Conn., with a capital stock of $1,100,000, to build an electric railroad 55 miles long through Berkshire County, Mass., extending from the Connecticut State line north through Sheffield, Great Barrington, Stockbridge, Lee, Pittsfield, Berkshire and Cheshire to Adams. Among those interested are: Ralph D. Gillett, Pittsfield; Franklin Weston, Dalton, Mass.; Thomas Post, Lenox; B. D. Rising, Housatonic; John P. Pomeroy, Great Barrington; W. B. Dean, Cheshire; J. D. Sanford, Springfield; Thomas D. Peck, Seymour, Conn.; W. H. Ely, Westfield.

BRITISH COLUMBIA ROADS.—Stuart Henderson, Solicitor of Ashcroft, B. C., is applying to the Legislature of British Columbia to build a railroad from the town of Ashcroft, B. C., to a point at or near the mouth of the Bonaparte River, thence north up the valley of the Bonaparte and along the west fork to Bridge Creek, thence along the valley to the Cariboo road to Quesnelle, with a branch to Barberville, and power to build 20-mile branches in any direction.

BUFFALO, NIAGARA FALLS & ROCHESTER.—Application has been made for right of way to the New York State Railroad Commission for this proposed electric line from Buffalo east to Greece, near Rochester, where connection will be made with the Rochester Electric system, in all about 120 miles, including branches. Congressman James O'Grady, of Rochester, is Counsel. Among the directors are Allen C. Beach, Watertown; Chas. S. Baker, Rochester, and Wm. H. Gillette, of Charlotte. (Construction Supplement, July 27, 1900.)

CASTLE VALLEY.—This company has been incorporated in Utah, to build a branch line for the Rio Grande Western from Saline east about 40 miles to Castle Valley.

CENTRAL RAPID TRANSIT.—This proposed electric line from Scranton, Pa., is to be 7½ miles, connecting suburban towns. There will be one viaduct. Hon. J. W. Lewis is President, and J. H. Brooks, Secretary and Treasurer. (Jan. 25, p. 69.) The central office is Scranton. (Official.)

CHATHAM & SUBURBAN.—Application has been made to the Ontario Legislature to reserve the charter of this road proposed between Chatham, Blenheim and Rondeau, on the south; Chatham, Mitchells Bay, Wallaceburg, Dresden and Petrolia on the north, and Tilsonburg on the west. This road will be a link in the system of radial railroads contemplated in this section of Ontario, and will in no way be a rival of the Chatham & Windsor Railway, now seeking a charter.

CHICAGO, MILWAUKEE & ST. PAUL.—A contract is let, according to report, for the extension from Iron Mountain, Mich., southeast about five miles to Quinnesec, to be completed in May.

CLEVELAND, WILLIAMSTOWN & BELINGTON.—This company has been organized at Williamstown, W. Va., to

build a railroad from that city east about 100 miles via Waverly, Glendale, Cornwallis, Harrisville, Pullman, Auburn, Troy and Weston to Belington. The same men have organized the Williamstown Railroad, Bridge & Terminal, whose incorporation was recently noted (Jan. 4, p. 16), to build a bridge across the Ohio River from Williamstown to Marietta, Ohio. It is stated that connection will be made for Cleveland with some existing line. Among those interested in the new line are: Hon. H. C. Henderson (President), Williamstown; John H. Lininger (Secretary and Treasurer), Harrisville; W. R. Ryan, of Cleveland, Ohio; Dr. A. H. Kunst, of Weston; T. F. Barrett, of Parkersburg.

Cumberland Plateau.—This company was incorporated in Tennessee, Jan. 22, with a capital stock of $100,000, to build a railroad from Johnston's Point, Cumberland county, north to Jamestown, in Fentress county.

Dayton, Springfield & Urbana.—This company, which is building an electric line from Dayton, Ohio, northeast 41 miles to Urbana, proposes, according to report, to begin building within a week a branch from Osborn, east 12 miles via Byron and Yellow Springs to Xenia.

Delaware & Hudson.—Application is being made to the New York State Railroad Commission for changes on the Nineveh branch at Lockwood's crossing, in the town of Colesville. Change of grades are also proposed at the Center Village and Plains road, and also in the town of Windsor at Fisher's and Comstock's crossings. In all these D. & H. proposes to bear the entire expense of change. (Aug. 31, 1900, p. 588.)

Detroit & Chicago.—This company was organized in Brooklyn, N. Y., Jan. 25, with a capital stock of $4,000,000, to build an electric railroad from Detroit, Mich., west to Jackson, and ultimately to Chicago. It will parallel the Detroit, Ann Arbor & Ypsilanti between Detroit and Ann Arbor, and will use the Jackson & Suburban Traction line as a part of the road. That company has recently obtained rights and franchises from Jackson to Ann Arbor, 38 miles. The road in Jackson is to be entirely rebuilt. W. A. Boland, President of the Jackson & Suburban Electric Traction, is also President of the new company; P. H. Flynn is Vice-President, W. A. Foote Secretary, and Frederick C. Cocheu, Treasurer, of the new company.

El Paso & Northeastern.—The contract for the El Paso & Rock Island extension for 130 miles of line from White Oaks, N. Mex., northeast to Santa Rosa, on the Pecos River, is reported let to Goode & Co., El Paso, Tex. (E. P. & R. I., Dec. 21, 1900, p. 851.)

Essex & Kent Radial.—Messrs. Cleary & Sutherland, of Windsor, Ont., are applying to the Legislature of Ontario to build this electric railroad from Windsor to Chatham, Ont., with branches from Maidstone Cross to the village of Wheatley, to the village of Cedar Springs and the town of Blenheim.

Illinois Southern.—Surveys are reported completed for the proposed extension from a point opposite Chester, Ill., southwest to the St. Louis, Iron Mountain & Southern line of the Missouri Pacific in Missouri. (Nov. 16, 1900, p. 764.)

Kansas City, Fort Scott & Memphis.—Building is reported begun on an extension of the Belleville branch from Zincite north about five miles to Carl Junction, Mo.

Lake Erie, Alliance & Wheeling.—This company was incorporated in Ohio, Jan. 26, to build a railroad from Fairport, in Lake County, on Lake Erie, to run south about 125 miles to Bridgeport, opposite Wheeling, W. Va. The incorporators are capitalists of Cleveland, Ohio, including Fred C. Hower, Lee Selover, W. Harper and A. J. Sweeney; also H. A. Garfield, a son of the late President Garfield.

Little Rock Southern.—The Little Rock & New Orleans Construction Co. was incorporated in New Jersey, Jan. 24, with a capital stock of $750,000, to build this line, which is projected from Little Rock, Ark., south 138 miles to the Louisiana State line, and thence to Bastrop, on the New Orleans & Northwestern. A. L. Phillips, of Little Rock, is Engineer in charge.

Lynn & Boston.—Building is reported begun on the Highland avenue extension of this electric line from Salem, Mass., to Lynn. The company is also to build a line between Lynn and Lynnfield.

Metropolitan Electric (Toronto).—Messrs. Barwick, Aylesworth & Wright, of Toronto, are applying to the Ontario Legislature for power to connect this company's tracks at its southern terminal with the Canadian Pacific, and to run its cars over the tracks of any company operating railroads in the city of Toronto, upon terms to be agreed upon between the respective companies and the city, for conveying passengers to the union station, the steamboat wharves and other points in Toronto, and to operate its whole line by electricity.

Mexican Roads.—The Mexican Government has issued a call for bids for the franchise for a railroad from Matamoras, west about 200 miles to Monterey.

Michigan Central.—Building is to be resumed, according to report, on double tracking the line between Ann Arbor, Mich., and Dexter, 9.6 miles.

New Orange & Four Junction.—This is the new name of the New York & New Orange, which runs from the Central of New Jersey near Cranford, N. J., to New Orange. The road is to be extended three miles further north in the early spring. (Sept. 28, 1900, p. 644.)

New York Central & Hudson River.—Sub-contracts have been let, according to report, on the entire West Branch Valley line from Clearfield, Pa., east 31 miles to Karthaus, on the Pennsylvania. The contractors are J. H. Corbett, Reading; Mason Hoge Syndicate, Frankfort, Ky.; Carpenter & Boxley, Clifton Forge, Va.; Miller Construction Co., Lock Haven, Pa.; H. O. Rogers & Co., Hyndman, Pa. The masonry work will be done by Nolan Bros., of Reading. (Dec. 28, 1900, p. 868.)

New York, New Haven & Hartford.—An officer writes that a plan has been discussed by the company with reference to a connecting line from North Attleboro, Mass., to run northwest about eight miles to Pleasant View, to connect with the Providence Division, but no decision has been reached. (Jan. 18, p. 52.)

Niagara District, Wellandport & Dunnville.—Messrs. Gorman & Pettit, of Welland, Ont., are applying for a charter to build an electric railroad from Niagara Falls, and the town of Thorald, through the townships of Stamford, Thorald, Pelham and Wainfleet, in Welland County, and through the townships of Canboro, Moulton and Sherbrooke and the town of Dunnville, in the county of Haldimand, to Port Maitland, in the same county, and through the townships of Caistor, Gainsboro, Clinton and Louth in the county of Lincoln, to Jordon Harbor or Station in the County of Lincoln.

Niagara Falls, St. Catharines & Toronto Electric.—Messrs. A. B. Colvin, ex-Treasurer of New York State, Ids Powers, his partner, and a number of Toronto capitalists are reported arranging with the Westinghouse Electric Co. for a through electric line from Toronto to Buffalo. Mr. Colvin is the head of the N. F., St. C. & T. E., which has been extended from St. Catharines to Port Dalhousie, and has bought a line of steamers to run from Toronto across Lake Ontario to Port Dalhousie. The route would be thence by the N. F., St. C. & T. E. through St. Catharines and Thorald to the arch bridge at Niagara Falls, Ont.; thence via the International Traction line over the bridge and along the Niagara River, and through the streets of Buffalo, direct to the grounds of the Pan-American Exposition. The new road is stocked at $1,000,000, and bonded for $500,000. It will do both a freight and passenger business and the promoters expect to carry 100,000 passengers to the Exposition.

Norfolk & Western.—This company will apply to the North Carolina Legislature for permission to extend its line through Carroll and Grayson counties, Va., and Alleghany, Ashe and Watauga counties, N. C. The company already has a branch to Chestnut Yard, Carroll County, Va., and the extension from that point will run about 75 miles southwest through the counties named.

Ontario Roads.—R. B. Henderson, solicitor of Toronto, is applying to the Ontario Legislature to build a system of elevated and surface electric railroads in the city of Toronto and adjoining municipalities.

Pennsylvania.—The company has let contracts on the improvements in Pennsylvania described last week (p. 70) as follows: Additional tracks between Juniata Bridge and Aqueduct Station, on the Middle Division, to James F. Kerns & Son, Pottsville; change of line and additional tracks in Lewistown Narrows, first section, P. F. Brendlinger of Narberth; second section, P. McManus, Philadelphia; additional tracks between Mount Union and Mill Creek, C. A. Sims, Philadelphia; additional track between Spruce Creek and Union Furnace, Keller & Crosson, Lancaster; four-track road between Larimer and Stewart, on the Pittsburgh Division, first section, Booth & Flynn, Pittsburgh; second section, F. M. Clement & Co., Philadelphia.

Building is reported begun on an extension of the Scalp Level line from Scalp Level, Pa., seven miles west of the lands of the Berwind White Coal Co., in Somerset County. H. S. Kerbaugh has the contract.

See also Baltimore & Ohio.

Pere Marquette.—Preliminary surveys are reported in progress for an extension from Howard City, Mich., west about 20 miles to Newaygo, to connect with the main line.

Qu'Appellee & Indian Head Electric.—Toronto capitalists are forming a company to apply for a charter under the Electric Railways Act to build an electric railroad between Indian Head and Qu'Appelle.

Quebec Central.—An officer confirms the statement that application has been made for extending this line from Scott Station, Que., to a point on the River St. Lawrence, but as yet no surveys have been made and no definite route fixed. (Jan. 18, p. 52.)

Red River & Southwestern.—Grading is completed from Henrietta, Tex., to Archer City, 30 miles, on this new line from Henrietta, on the Missouri, Kansas & Texas, to run northwest 140 miles via Archer City and Salcinford to Abilene, on the Texas & Pacific. The company expects to lay track on the 30 miles this year. (Construction Supplement, July 27, 1900.) E. B. Carver, of Henrietta, is Vice-President and General Manager. (Official.)

Rochester & Eastern Rapid.—This company was incorporated in New York Jan. 21, with a capital stock of $500,000, to build an electric line from Brighton, terminus of the Monroe avenue line of the Rochester Ry., to run southeast via Pittsford to Geneva, with a branch from Pittsford east to Fairport, in all 45 miles. The directors are: Albert E. F. White, John Winter, A. Lindsley Parker, Frank C. Andrews and Oliver H. Law, of Detroit; Eugene H. Satterlee, of Pittsford; Oscar N. Crane, of Canandaigua; Spencer F. Lincoln, of Naples, and John F. White, of Buffalo.

St. Louis, Cape Girardeau & Southern.—Contracts will be let in February for this proposed line from Cape Girardeau, Mo., northwest about 45 miles via Jackson to Perryville to connect with the Chester, Perryville & Ste. Genevieve. Contracts will be let for grading five-mile sections, all contracts to have the time limit, and bonds will be required. The company is controlled by Houck's Missouri & Arkansas, and L. B. Houck, of Cape Girardeau, Mo., President of that company, is also President of the new line. (Dec. 7, 1900, p. 818.) James F. Brooks, Cape Girardeau, is Chief Engineer. (Official.)

Southern.—On Dec. 6 a contract was let to W. J. Oliver & Co., of Langley, S. C., for building what is known as the Reynold's spur from a point 1,670 ft. west of mile post 7, on the Blocton Branch near Cahaba River, to run south through Bibb County, 1.35 miles, to coal mines of the Blocton & Cahaba Coal Co. About one-half the grading is completed. (Official.)

Southern Missouri & Arkansas.—An officer writes that the company is about to put under contract its proposed extension from Mingo Station, Mo., southwest about 15½ miles to Poplar Bluff. (Jan. 11, p. 34.)

Southport & Western.—A bill has been introduced in the North Carolina House to charter this company, with a capital stock of $100,000, which may be increased to $25,000,000, to build a railroad from Southport or Wilmington northwest across the State to the Tennessee line. The stockholders are Wm. E. Worth, Walker Taylor, W. W. Thompson, W. T. Shay and A. J. Hines.

Strathroy & Western Counties.—Allan H. Royce, of Toronto, is making application to the Ontario Legislature for an extension of time for the commencement and completion of this company's road. (Oct. 26, 1900, p. 712.)

Sylvania.—An officer writes that surveys are in progress for an extension from Sylvania, Ga., to run north about 20 miles to Girard. The surveys will be completed in about two weeks when the company expects to let contracts for building. New securities to meet the expenditures will probably be issued. The rails will be 56-lb.; there will be two bridges, both wooden. The line now runs from Rocky Ford, on the Central of Georgia, northeast 15 miles to Sylvania. W. M. Hobby, of Sylvania, Ga., is Superintendent.

Toronto Suburban.—Application will be made to the Ontario Legislature by Allan H. Royce of Toronto, for an act to permit an increase of capital stock to enable the company to extend its line through the counties of Peel and Halton to the city of Hamilton, Ont.

Union Pacific.—Contracts are reported let for a cut-off 18 miles long, between Cheyenne, Wyo., and Denver, to reduce grades at Athol Hill. (Construction Supplement, July 27, 1900.)

Union Railroad & Transportation.—Surveys are just completed for this proposed line from Union, Ore., southeast up Catherine Creek and along the Lower Powder River to Snake River, about 80 miles. It is proposed to absorb the Union Street & Suburban line, about two miles long, in the city of Union. (Jan. 11, p. 34.) As soon as maps, etc., are completed the company will be ready to float bonds. Geo. F. Hall, of Union, is interested. (Official.)

Wabash.—Bids are reported let for building the Montpelier extension. (See Railroad News column.)

Washington & Oregon.—Condemnation proceedings are begun for right of way on this proposed line from Portland, Ore., north to Tacoma and Seattle, Wash. It is stated that the right of way and grade of the Portland & Puget Sound will be used. This was an old project of the Union Pacific, abandoned a number of years ago. Allen G. Mason, of Tacoma, is an incorporator of the new company. (Dec. 14, 1900, p. 834.)

GENERAL RAILROAD NEWS.

Alabama, New Orleans, Texas & Pacific Junction.—Upon surrender of coupons 19 and 20, due May 1 and Nov. 1, 1900, interest from profits for the year 1900 on "B" debentures will be paid at the full 5 per cent. rate, less income tax, by Glyn, Mills, Currie & Co., 67 Lombard street, London.

Buffalo, Rochester & Pittsburgh.—The interest on the $1,000,000 6 per cent. debenture bonds has been reduced to 5 per cent. from Jan. 1, 1901, and has been accepted by the holders of the entire amount outstanding.

Chicago, Burlington & Quincy.—Eighty-six bonds for $1,000 each, and 12 bonds for $100 each of the Denver extension 4 per cent., due Feb. 1, 1922, have been called for payment at par at the New England Trust Co., Boston, on Feb. 1, interest to cease from that date. (Jan. 11, p. 34.)

Chicago City.—The new $4,500,000 stock is offered at par to stockholders of record June 15, in the ratio of one share of new stock for each three held. (Jan. 25, p. 70.)

Choctaw, Oklahoma & Gulf.—According to the company's annual report, a mortgage for $1,000,000 on coal properties, and $15,000 per mile on the railroad now owned and to be built hereafter, is to be authorized as a consolidated mortgage. The proceeds are to be used for extending the line and for other purposes. (Dec. 28, 1900, p. 868.)

Illinois Central.—At a special meeting of the stockholders, held at Chicago, Jan. 26, the capital stock was increased from $60,000,000 to $66,000,000. The new issue is to be sold at par to present stockholders, to be used for new equipment and other improvements. (Nov. 30, 1900, p. 802.)

Indiana, Illinois & Iowa.—The company gives notice that on Feb. 1 it will exercise its option to pay the first mortgage 5 per cent. refunding gold bonds of 1948, and interest will cease after that date. (Jan. 18, p. 52.)

Los Angeles Terminal.—The California Improvement Co., an Illinois corporation, which controls the Los Angeles Terminal and other properties, has transferred its holdings in the L. A. T. into the new San Pedro, Los Angeles & Salt Lake. (Jan. 4, p. 16.)

Pere Marquette.—The first dividend, being 4 per cent., on the preferred stock, has been declared out of the earnings of the first year of the consolidated road. It is understood that quarterly dividends of 1 per cent. will be paid hereafter.

Santa Fe Pacific.—The House Committee on Pacific railroads, on Jan. 26, adopted a bill authorizing the sale or lease of this road to the Atchison, Topeka & Santa Fe. The Atchison controls this road through ownership of the capital stock. Provision is also made that the company shall pay $200 a mile on its road through New Mexico, to be apportioned by the Legislature to the counties; also until 1902, $125 per mile taxation, and thereafter $200 per mile until the courts decide the law governing taxation in territories, or until the territories become states.

Texarkana, Shreveport & Natchez.—An officer of this company is reported as stating that the Texas & Pacific has obtained an option, until Feb. 9, for acquiring this property. It extends from Texarkana, Ark., to Shreveport, La., 72 miles, and is projected to Natchez, Miss., about 200 miles in all. (Construction Supplement, July 27, 1900.)

Texas & New Orleans (Southern Pacific).—The Atlantic Trust Co., trustee, New York, calls for bids up to noon, Feb. 21, for first mortgage bonds at 110 and interest, to absorb $200,000. (May 25, 1900, p. 348.)

Toledo & Ohio Central.—The stockholders will vote, on Feb. 7, on the proposition to execute "certain first mortgage branch and income bonds, to be used in purchasing, constructing and otherwise acquiring additional branch line or lines of railway."

Wabash.—The stockholders and debenture bondholders will vote, on March 19, as to the building of two proposed lines of new road. (1) The extension long under consideration from Toledo, Ohio, west about 57 miles to a point near Montpelier, Ohio; and (2), the Fort Wayne & Butler line from Fort Wayne, Ind., northeast 27 miles to Butler. The proposition includes the acquiring by purchase or lease of any lines of other companies that may be built along these routes. The stockholders and bondholders will also vote as to the proposed issue of bonds not to exceed $3,000,000 to cover the proposed lines; also as to $3,000,000 equipment bonds. (Jan. 25, p. 70.)

They will also be asked to acquire the Kansas City, Excelsior Springs & Northern, extending from the company's line to Excelsior Springs, Mo., about nine miles, and to guarantee the principal and interest of the company's bonds not to exceed $100,000 at 4 per cent.

Wheeling & Lake Erie.—Spitzer & Co., New York and Toledo, offer $500,000 first consolidated mortgage 4 per cent. gold bonds due 1949, at a price to yield about 4½ per cent. (Aug. 3, 1900, p. 532.)